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U.S. ARMY INSTITUTE FOR RESEARCH
IN MANAGEMENT INFORMATION,
COMMUNICATIONS, AND COMPUTER SCIENCES
(AIRMICS)

ISDN IN THE ARMY: WHAT ARE THE REALISTIC EXPECTATIONS

(ASQBG-C-89-019)

October, 1988

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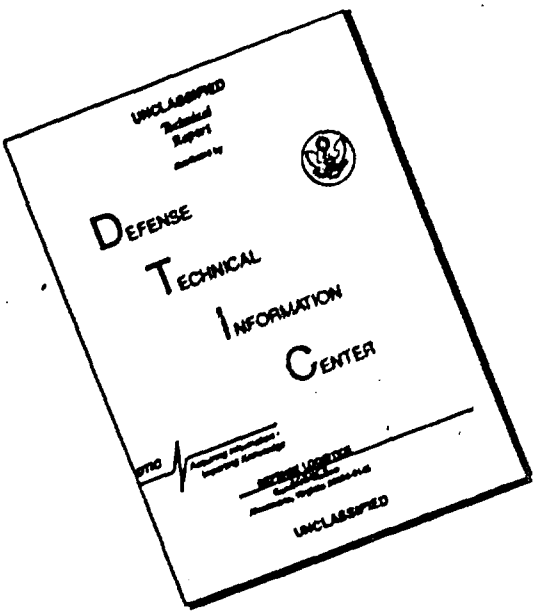

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Final Report - ISDN in the Army: What are the Realistic Expectations

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1. Executive Summary

This report discusses the results of a research project concerned with the impact of ISDN on the Army. The research project consisted of three parts, the first was an engineering survey and technology forecast. The second and third parts were concerned with bringing together the prime Army experts in ISDN and to review the understanding of the Army's transition strategy for moving to ISDN. The key results of the project are summarized below with backup and further discussion of the results in the body of this report. The results have been clustered into areas of

IMPROVE ISDN EDUCATION

The Army needs to conduct a series of training sessions tailored to all levels of users of ISDN to inform them of what ISDN offers and what its limitations are.

The planning meeting for the workshop as well as the workshop itself identified a disparate level of knowledge of ISDN within the Army and what it was able to do and what it is not able to do.

EFFECTIVELY UTILIZE OTHER'S EXPERIENCES

The Army needs to maximize the use of the experiences of other ISDN users and providers.

Numerous commercial and government organizations are conducting or have conducted ISDN field trials. The Army should utilize and participate in those experiences in its own planning for the transition to ISDN.

SUPPORT THE DEVELOPMENT AND EXPLOITATION OF ISDN APPLICATIONS TECHNOLOGY

The Army should support the development of ISDN applications tailored to its needs.

The effective use of ISDN will depend on the exploitation of applications technologies developed for ISDN. In addition to exploiting technologies developed in the commercial marketplace, the Army needs to develop its requirements for Army specific ISDN applications.

ASSESS THE IMPACT OF ISDN ON O&M

The Army needs to evaluate the impact of ISDN on O&M functions since it contains more than just switching system technology.

One particular problem identified in the already conducted field trials is that the O&M community was not adequately prepared to support ISDN. The merging of automation (hardware and software), switching and applications technologies increases the responsibilities of O&M organizations.

ASSESS THE TRUE COSTS OF ISDN

The Army needs to develop comprehensive cost data to adequately assess the cost/benefit of ISDN in all aspects of Army operations.

The Army needs to assess the true costs of ISDN. Transition to ISDN is perceived as a mechanism to merge voice and automation functions without having to replace extant plant. Beyond the cost of installing ISDN switches ISDN, for example, requires ISDN terminals, or adaptors, replacement in some cases of local area networks, network bridges, and the development or purchase of applications.

ALLEVIATE SECURITY CONCERNS

The Army needs to alleviate any concerns of security associated with the operation and use of ISDN.

ISDN technology allows for potentially easier breaches of security due to its interconnection of voice and automation functions over common networks.

2. Introduction

This is the final report of the Interoperable Global Information Services Research Program. The project was tasked with investigating Integrated Services Digital Network (ISDN) technology and its impact on the U.S. Army Information Systems Command (ISC). The project was broken down into three major subtasks: 1) an engineering survey and technology forecast (reported on in a previous deliverable [AIRMICS]); 2) the conduct of a video workshop to gather opinions of experts on the issues associated with the transition to ISDN; and 3) a set of recommendations for facilitating the Army's transition. The results of subtasks 2 and 3 are contained in this report.

The report is organized with this introduction followed by an investigation, conclusions and recommendations sections. In addition, there are attachments that include the agendas, and participants of both sessions, and a copy of the presentation materials of the video workshop.

The issues, conclusions, and recommendations are the author's and not necessarily those of the workshop participants nor of the US Army.

3. Investigation

3.1. Subtask 1

The purpose of subtask one was to conduct a state-of-the-art survey of extant ISDN technologies and most importantly, experiences of the commercial and government sectors with usage or trials of ISDN. A general literature survey was conducted and that survey was augmented with previous work performed by the University of Arizona [Arizona]. In addition to the need for technological currency, the survey allowed us to contact those who had been involved with usage or trials to participate in the planned workshop which was a part of subtask 2 of this project.

3.2. Subtask 2

This subtask was accomplished in two parts, the first was the conduct of a planning session at the University of Arizona to determine the agenda of the video workshop. The planning session was conducted in the Planning and Decision Support Laboratory of the Management Information Systems Department of the College of Business and Public Administration. The list of participants in the planning session are included as Attachment A of this report. The planning session was conducted on December 2 and 3, 1987. The agenda for the video conference was produced and much active discussion occurred as a result of trying to produce the agenda.

Several interesting issues beyond the development of the agenda were observed at the workshop. These issues were addressed at the video conference and are discussed in detail in the discussion and conclusions sections of this report. Essentially the issues were concerned with education, management, and execution of the transition to ISDN.

3.3. Subtask 3

This subtask completed the agenda for the video workshop, invited the speakers and conducted the workshop. The workshop was conducted on May 25, 1988, and was broadcast from the Georgia Institute of Technology, the University of Arizona and the University of Maryland. The broadcast was able to be received at any location in North America that had an Association for Media-Based Continuing Education for Engineers (AMCEE) satellite receiving station. In addition, the broadcast was videotaped and the tape of the sessions is available by request to the Director, AIRMICS. The workshop presenters and the agenda are included as Attachment B and C, respectively, to this report. Attachment D includes a summary of the presentations as well as the presentation materials of the participants of the video workshop .

The video workshop served to clarify some of the issues that had been identified in the previous planning session as well as confirming some of the issues that need further investigation. The issues are included as a part of the discussion section.

4. Discussion

This project was motivated by the Army's recognition that it needs to be fully prepared to manage the inevitable transition to the integration of communication and automation technologies utilizing ISDN and that it needs to be prepared to exploit ISDN applications technologies as they become available. In addition, the Army identified a need that all levels of management in the Army should possess a thorough technical understanding of ISDN, so that decisions on its use would be made based on an understanding of what ISDN can and can not support.

Since ISDN is a technology that supports the merging of automation interconnectivity and voice circuit switching, it crosses a barrier of separation between communications and computer technologists and managers. This merging of technologies was recognized by the Army in 1984 with the decision to combine automation, communications, records management, audio/visual, and printing and publications, into a new functional area, the "Information Mission Area" [Army]. The concern with the merging of automation interconnectivity and voice circuit switching with ISDN was also reflected in the field trial presentations of the commercial sector at the video workshop and in discussions the author of this report had with other commercial field trial personnel. These people felt that the most significant issue of ISDN was not the technology, per se, but the coordination and management requirements of the technology. The Army has experienced similar problems with its Information Mission Area merger [Army]. The video conference confirmed the conjecture that the major issue in transitioning to ISDN is related to managing the total transition (computers, communication and applications) and that the transition should be looked at from a perspective of the operational and policy as well as procurement point-of-view.

4.1. Planning Session

At the planning session we had gathered what we felt was a set of the prime personnel that would be involved in ISDN from a user as well as a provider perspective. We use the terms users and providers to separate the different views of two groups that will possibly be impacted by ISDN. Users can be grouped as those organizations that will be using the services of the technology, where providers are those groups directly or indirectly involved in the implementation of the technology, such as policy makers, installers, and planners. It is also recognized that users and providers are not necessarily disjoint sets and that a user may be a provider and vice versa in different instances of operation. That group of people was gathered at a single locality to develop the agenda for the video workshop. The purpose of the meeting was to identify the issues of the Army's transition to ISDN and to determine what areas of research and/or development were necessary to insure a smooth transition.

4.1.1. Issues from the Planning Session

It became apparent from the discussions, that using attendees had differing opinions on what ISDN was, what it wasn't, how it would help their organizations, how it would interfere with the operation of their organizations, and what was necessary for their organization to prepare for it or to at least anticipate its arrival. It should be noted here that there isn't really a question of whether ISDN (in the sense of switching technology) will be a reality. The vendors of switches are anticipating marketing ISDN switches in the near future and that is the technology that they will support. In addition, second party markets are appearing that are developing ISDN supporting technologies, such as ISDN terminals, ISDN interfaces to PC's, and ISDN applications. The provider attendees had no doubts as to whether ISDN would occur, since they felt (in all likelihood correctly) that the technology that they could purchase in the commercial market place in the future would be ISDN-based and thus that would be the technology that they would have to buy.

4.1.2. Recommendations from the Planning Session

In addition to the recommendations for the video workshop agenda, a recommendation was formulated from the planning discussions that was not included in the workshop agenda. The recommendation was the need for ISDN education. The Army needs to conduct a series of training sessions tailored to all levels of personnel to inform the users of the technology exactly what ISDN is and what it is not. This series should be focused at the "middle" managers who are not part of the ISDN

"community" but will be impacted by its usage in their organizations. The video workshop included a presentation by Dr. Philip Enslow that overviewed ISDN. His brief introduction was included to try to mitigate any confusion over the subjects to be discussed later in the workshop. Such a presentation, probably more comprehensive for more technical personnel, should be available to all potential users as well as providers and decision makers in the Army. The inclusion of Dr. Enslow's presentation as well as this recommendation was made based on the discussions at the planning session, in that the participants in it had a disparate knowledge of ISDN and had misinformed opinions of what its purpose, scope, and effect is and the impact it will have on the Army.

4.2. Video Workshop

As has been previously mentioned, the video workshop was conducted on May 25, 1988, and was broadcast from the Georgia Institute of Technology, the University of Arizona and the University of Maryland. The motivating factor for selecting the video format for the workshop was that, we felt the issues to be discussed at the workshop were important to the whole Army and that the best method of disseminating the information was through a broadcast format. Appendix A of this report contains a description of the lessons learned in conducting a video workshop.

4.2.1. Agenda Review

The agenda of the workshop was intended to present a perspective of ISDN as an emerging technology from both the user as well as the provider viewpoint. The first part of the agenda provided an overview of ISDN and the expectations of the technology. The second part of the agenda was intended to provide the current Army communication plans and the Defense Communications Agency (DCA) policy level recommendations for ISDN. The last session dealt with user/provider perspectives of ISDN. In addition, there was a wrap-up session that tried to summarize the day's events and issues and questions that were identified. The following section will describe the issues and questions.

4.2.2. Issues and Questions

It was apparent from the presentations and discussions that there is a potential problem with the Army's ISDN transition plans. The missing element is that there does not seem to be a management linkage between the implementation level (those who are charged with purchasing and installing switching systems and networks) and the policy level (such as DCA and the Army, Director for Information Systems for Command, Control, Communications, and Computers). This problem has also been identified by some of the field trial personnel in the commercial sector. As has previously been mentioned, ISDN crosses previously separate technological arenas, namely communications and automation/local area network technologies. Therefore, it is not surprising that there is often a missing linkage. Historically, switching systems have been the purview of the communications organizations. They are chartered with planning, installing, maintaining and operating the telephone systems of enterprises. These groups have not been involved in the computational technologies. Even though their systems supported usage of computers, there was a reasonably clean separation between the technologies. This interface definition is useful when management structures and the associated authority and responsibility mechanisms can be put in place and effectively managed. Conversely, the distinctions of communications and computer systems is becoming blurred with contemporary technology. ISDN is an example of the blurring of the technology. This is probably a necessary evolution, both in a marketing sense as well as a technical sense. The providers of communications technologies can increase market share by continuing their migration into the information systems domain and conversely computation providers can move toward the communications markets. The technical issues are also apparent, in that a goal of both markets should be to provide integrated information systems that are transparent from a user's perspective as to their locality, centralization and interconnectivity. The result of the blurred interfaces, is that both sides of the communications/automation arena are now having difficulty defining their areas of responsibility and authority and are having problems with understanding the translation of policy measures to implementation objectives and plans. An example issue could be what are the effects on the Operations and Maintenance (O&M) community on the maintenance of ISDN systems. The technology of ISDN includes software and maintenance of that software. Typical communications O&M functions in the past have been concerned with hardware maintenance.

Are there hidden costs associated with the use of ISDN? Questions that should be addressed include; have costs for terminal equipment been included, have retraining costs for O&M personnel been included, have impacts of tariff regulations been assessed? Most commercial justifications for ISDN center on plant installation savings, that is, the availability of installed wires being used and the savings of not having to install new plant to affect computer communication.

Has the impact of ISDN on security been completely addressed? Connectivity typically lessens security because of the loss of physical security.

How can the Army capitalize on the experiences of other users of ISDN to minimize the unnecessary lesson learning that can occur? Several field trials have been conducted with commercial companies and government groups such as McDonalds and the State of Arizona, respectively. In addition, the Air Force is conducting an extensive trial at Mather AFB. Can the Army directly participate in the Air Force trials, and has the Army consulted with the other groups who have already concluded their trials? Also has the Army contacted the European groups who are installing and using ISDN in their countries for their experiences?

How can the Army properly exploit ISDN applications technologies? One of the areas that is just beginning to mature is the understanding of applications technologies that capitalize on the technical features of ISDN. Many of these applications will be software packages that utilize the underlying communications mechanisms of ISDN to more effectively offer functionality to the user. Examples include, mobile ISDN using digital cellular radio, broadband ISDN and video technology integration, applications programs that utilize the ISDN medium to effect low cost distributed systems, and numerous items that won't be considered until the technology is in place. The Army needs to position itself to be prepared to exploit the technology for its own mission.

The issues and questions listed above are based on a perspective of proactive management. On the other hand, ISDN could be treated as an addition to the infrastructure of the Army and thus would be treated as merely an addition of modern technology to an existing system. This approach could be taken from a view that the extant plant won't be effected by the addition of ISDN, and that the usage of it can be more efficiently managed on a learn as you go basis.

5. Conclusions

The conclusions of this type of project are different than that of a typical research project in that we initiated it with the goal of determining the potential impact of ISDN on the Army from a user perspective in particular. The results of the project can be categorized into Army impact, provider impact and user impact. The provider impact (ignoring the O&M question for the moment) is minimal, in that they are going to be buying ISDN switches in the future because that is what the commercial market is going to offer. The user impact is based on a perspective of services offered, not technology. Users require certain capabilities to conduct their mission. If ISDN provides those services, the user will be satisfied. If it does not, most users will find mechanisms that will provide those services. The services the user provides on his own may not be cost effective nor may they conform to industry and government standards as they most likely will be created in isolation. This has been called "Islands of Automation", in the Information Mission Area, with each organization creating its own solutions to common problems [Army]. A question also arises here as to services being provided that are not required by the user and whether or not those services will be used and if so will those services have an impact on the efficiency of the missions of the user community. From the Army impact category, the conclusions one can draw are:

1. The complexity of ISDN probably requires a broader view at the middle management level than one would normally expect from a communications system upgrade.
2. The true costs of ISDN probably haven't been evaluated beyond the base installation costs. ISDN can probably affect significant savings in that arena, but what are the offsetting costs that may occur in the usage, operations, and maintenance areas?
3. Can the Army capitalize on the experiences of other users and providers of ISDN and reduce the costs and mistakes of the introduction of the service?

4. Can the Army influence and exploit the applications technologies that will be developed for ISDN?

6. Recommendations

The recommendations of this project are not specifically aimed at conducting new technical research. The technology of ISDN exists or is in development. The questions that need to be answered are concerned with management of the introduction of the technology and how to best utilize the technology in a cost effective manner once it is introduced. Specific recommendations are as follows:

Maximize the use of the experiences of other ISDN users and providers.

A program should be undertaken to utilize the experiences of other users in developing the Army plans, including direct technical and managerial involvement in the Air Force project. In addition, Army personnel should interact with other commercial field trial users and providers such as the European telecommunications industries, the McDonalds management and operations personnel, the Bell Operating Companies, the State of Arizona, and other field trial users and providers.

Support the Development and Exploitation of ISDN Applications Technology

Two items should be addressed. First, the Army should be technically aware of the applications technologies that are and will be developed for the commercial market place. An effective use of ISDN will take advantage of those applications. Second, the Army should decide which areas of application technology it should influence for its benefit.

Evaluate the Impact of ISDN on O&M functions.

ISDN crosses the automation/communications boundaries, responsibilities and authorities can thus become blurred. Questions should be answered as to who is responsible for maintaining ISDN-based applications software, who is responsible for changing the functionality of the ISDN system, who is responsible for purchasing, installing, and maintaining ISDN terminals and associated equipment and then maintaining both the software and hardware. Once responsibilities have been established, then determination of whether those responsible are adequately trained to perform their mission has to be assessed.

Assess the true costs of ISDN.

Costing data should be developed to address the total cost of introducing ISDN including the impact on organizational efficiency and operations as well as structures. Cost data should also be developed for any required training/education of the O&M and user personnel.

Security Issues Need to be Fully Understood.

Security implementations potentially become more complex with the interconnectivity offered by ISDN. ISDN technology allows easier breach of security due to its ease of interconnecting voice and automation functions. At the simplest level, this can force encryption/decryption of more information than is necessary. In addition, the goal of ISDN to allow complete interconnectivity of voice and data circuits is counter to the goal of a most effective security measure which is physical security.

Appendix A

The selection of the transmission media, the AMCEE satellite network, was based primarily financial considerations. AMCEE and its sister network, the National Technological University (NT are a non-profit educational system established to promote the dissemination of educational informat to the nation. Members of the networks are universities, industrial firms, and government agencies. Th networks have a daily agenda of university level credit courses that are initiated by universities and sp cial event/workshop presentations such as this workshop. The AMCEE portion of the network supp workshop type presentations. The only disadvantage of utilizing the AMCEE network is that it re a special "half-band" receiver for reception of the broadcasts. This limits reception to membe panies, universities, and government agencies. This results in a somewhat limited dispersi information, but we felt the cost factors overrode that issue since in addition to broad workshop, we intend to distribute the video tape of the workshop to all interested parties.

We also considered the use of the Defense Commercial Televideo Network (DC delivery mechanism. It was not selected because it was not available at all of the antici sites and is primarily designed as a video conferencing network and thus did not have a bility.

We planned the workshop to be broadcast from three sites to ease the burden and ticipants having to travel to and from a single site. Invitees were from Arizona, Geo and the Washington, DC areas. Thus the three sites were chosen to be as central to tions of participants.

A minor factor was the question of what is the difficulty of arranging a video teleconference of this magnitude and what are the issues that should be addressed in the future use of this technology. There are obvious and not so obvious issues that were discovered in preparing for the event. First and most difficult is the classical problem of scheduling, but in addition to the usual problem of scheduling the speakers and participants, we had the problem of scheduling satellite time and studio time. Since we anticipated broadcasting from three sites, we had to coordinate the schedules of the three university's studios, uplink and downlink equipment, and support personnel as well as the satellite itself. The power of using broadcast video technology is the easy dissemination of information and the reduction of travel requirements for the participants. In addition to these motivations was our hope of creating a dialogue between the participants at the three sites as well as those who were watching the workshop. The dialogue was minimal. Our conjecture, which was substantiated by the studio managers, was that the dispersion of the participants, the one-way video, the difficulty of calling the sites with questions, and the fear of being "on the air" significantly reduced the effectiveness of the workshop. A mechanism to improve interactions is to use n-way video transmission (that is, simultaneous transmission/reception with multiple sites). This would allow improved interaction of the personnel at the points of transmission, however, it would not improve the participation of people who were watching but not located at the transmission sites.

ATTACHMENTS

ATTACHMENT 1

AGENDA AND PARTICIPANTS IN VIDEO WORKSHOP

ISDN in the ARMY: What are the Realistic Expectations

25 May 1988

The U.S. Army Institute for Research in Management Information,
Communications and Computer Sciences

Fig p.3

Due to the significant progress in digital communications technology and the increasing demands by users for improved data, voice and image transmission, as well as the demands for reduced costs of communications, providers have proposed [illegible] called the Integrated Services Digital Network (ISDN). ISDN as currently [illegible] transmission needs and provides value added services to users of these [illegible] single network for all communications requirements. In addition [illegible] ISDN attempts to maximize the use of existing plant of the user's facilities.

The U.S. Army Institute for [illegible]nation, Communications and Computer Sciences (AIRMICS) is sponsoring [illegible] presented on the NTU/AMCEE Satellite Network to discuss the impact of Integrated Servi[illegible] Digital Network (ISDN) technology on the U.S. Army's communication plans. In particular, this conference will explore the relationship to the user's communication needs with the services to be offered by ISDN. The purpose of the conference is to determine if any specific research topics need to be addressed with problems of transitioning to ISDN.

The conference will start with an overview of ISDN technologies. This section will be broadcast from Georgia Tech. The second session will be a series of presentations on the current and future Army communications baselines and their relation to ISDN. The second session will be broadcast from the University of Maryland. The final session will be a series of talks by users and providers of ISDN services. The final session's speakers will consist of people who have been directly involved in ISDN field trials and will be broadcast from the University of Arizona. Each session will terminate with a discussion section, to provide a forum for the session's speakers and appropriate discussants to summarize the results of the session and to pose questions for future review.

The Association for Media-Based Continuing Education for Engineers (AMCEE) provides short courses and seminars via satellite and video tape. It was founded several years ago to promote continuing education for the engineering profession. The prime vehicle for delivery is the NTU/AMCEE Satellite Network which consists of over 30 universities and numerous government and industrial locations. AIRMICS and Georgia Tech, with cooperation from the University of Arizona and the University of Maryland, were able to schedule this teleconference on the NTU/AMCEE Satellite Network.

The conference will be broadcast from three sites, Georgia Tech, the University of Maryland and the University of Arizona. The conference will convene at 1100 EDT and will terminate at 1700 EDT on the 25 of May, 1988. Each site will transmit for approximately one and one half hours with time allowances for breaks and equipment changes. In addition to the transmit sites, the program is available to anyone with a receiver equipped to receive the NTU/AMCEE transmission methods. The conference has been announced on the NTU/AMCEE Satellite Network.

Session Outline

1. Welcome and Introduction
   Mr. John Mitchell - AIRMICS

2. Overview of ISDN

   Source Site - Atlanta, GA
   Time 1100 - 1245 EDT
   Site Coordinator - W. Michael McCracken - 404-894-6172
   Discussion Leader - Major Allen Osborne - 404-894-3136
   Video Coordinator - David Edwards - 404-894-3378

   Speakers
   Dr. Phillip Enslow - Georgia Institute of Technology
   Mr. James Whitehead - Bell South Services

   2.1 What is ISDN ?
   2.2 What ISDN is not
   2.3 When will ISDN be truly available on the competitive market place ?
   2.4 Discussion - What impact will ISDN have on the communications marketplace?

3. The Army Communications Baseline

   Source Site - Washington, DC
   Time 1300 - 1445 EDT
   Site Coordinator - Dr. Spencer Rugaber - 404-894-8450
   Discussion Leader - Dr. Spencer Rugaber - 404-894-8450
   Video Coordinator - Mr. Bruce Rights - 301-454-8888

   Speakers
   Capt. Corzine - U.S. Army PEO Networks
   Mr. Robert Annett - U.S. Army PEO Networks
   Dr. Owen Halpeny - Defense Communications Agency

   3.1 What are the current and future Army communications requirements ?
   3.2 What is the current Army communications upgrade plan ?
   3.3 What are the Army plans for transitioning to ISDN ?
   3.4 What are the DCA plans for transitioning to ISDN ?
   3.5 Discussion - How do these ISDN plans impact the user community ?

4. What are the Effects of ISDN

Source Site - Tucson, AZ
Time 1500 - 1700 EDT
Site Coordinator - Dr. Ralph Martinez - 602-621-6174
Discussion Leader - Dr. Ralph Martinez - 602-621-6174
Video Coordinator - Ms. Eileen Matz - 602-621-5084

Speakers
Mr. Mathew Whittington - State of Arizona
Mr. Lee Bryant - Mountain Bell

4.1 What are the Effects of ISDN from a Provider Perspective ?

4.1.1 What are the benefits to the providers of the types of services and capabilities that will be provided ?

4.1.2 What are the resources required to provide those services ?

4.1.3 Will ISDN create increased functional capabilities for the provider and to the user ?

4.2 What are the Effects of ISDN from a User Perspective ?

4.2.1 What services do current capabilities not provide ?

4.2.2 What are the future services that ISDN may provide ?

4.2.3 What are the costs and savings to transition to ISDN ?

4.3 Discussion - What should be the Army be doing to transition to ISDN ?

ATTACHMENT 2

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ATTACHMENT 3

VIDEO WORKSHOP PRESENTATION SUMMARIES

The following paragraphs provide a brief overview of the presentations that were made at the video workshop. For more details of the presentations refer to Attachment 4 which contains the briefing charts and to the video tape made of the workshop.

1. ISDN A Brief Introduction - Dr. Philip H. Enslow, Georgia Institute of Technology

Dr. Enslow's presentation consisted of a concise introduction to ISDN including what it is and what it is not. He reviewed the history and the future of ISDN and discussed the potential problems with the technology.

2. When Will ISDN Be Available - Mr. E. C. Whitehead, Bellsouth Services

Mr. Whitehead presented a view of ISDN from the operating company perspective. He reviewed the deployment strategy of Bellsouth Services for the introduction of ISDN and presented some current and planned specific ISDN projects that Bellsouth is deploying.

3. Army Telephone Communications and ISDN - Capt. Mark Corzine, U.S. Army, PM Switched Systems

Captain Corzine overviewed the Army's plans for telephone communications upgrade and the transition to ISDN. He described the major upgrade projects for the Army throughout the world and discussed the Conus Telephone Modernization Program. In addition, he discussed the Installation Information System Improvement Program.

4. DoD Planning for ISDN - Dr. Owen Halpeny, Defense Communications Agency

Dr. Halpeny provided a review of the DoD's ISDN plans. This discussion included the current working groups involved at the DoD planning level, what the activities of those groups are, and the draft schedule for the major milestones to be accomplished to accommodate the transition to ISDN. Dr. Halpeny concluded with a discussion of the principal open questions of ISDN, which included requirements, complete and stable standards, and the cost effectiveness of ISDN.

5. What We Learned - Mr. Matt Whittington, State of Arizona

Mr. Whittington reviewed the ISDN field trials that had been conducted by the State of Arizona with U.S. West from a user perspective. He described the trial approach and the positive and negative results that had resulted in the trial.

6. ISDN from U.S. West - Mr. Lee Bryent, Mountain Bell

Mr. Bryant reviewed the same field trial as Mr. Whittington, from a provider perspective. Mr. Bryant also discussed other trials that U.S. West has conducted and reviewed their findings to date.

ATTACHMENT 4

VIDEO WORKSHOP PRESENTATION MATERIALS

ISDN A Brief Introduction

Dr. Philip H. Enslow, Georgia Institute of Technology

ISDN

A Brief Introduction

Presentation at the Conference
"ISDN in the Army: What are Realistic Expectations"

Sponsored by
The U.S. Army Institute for Research in
Management Information, Communications
and Computer Sciences

25 May 1988

Philip H. Enslow Jr.
School of Information and Computer Science
Georgia Institute of Technology
Atlanta, Georgia 30332
(404)894-3187

ISDN --- CCITT Definition

An ISDN is a network, in general evolving from a telephony IDN (Integrated Digital Network), that provides end-to-end digital connectivity to support a wide range of services, including voice and non-voice services. to which users have access by a limited set of standard multipurpose user-network interfaces.

ISDN --- What It Is

Integrated Digital Access to ALL Services

Potential for increased subscriber control

A series of
CCITT Recommendations--- The "I-Series"
Amplified by U.S. Standards --- T1

Telecommunications Services

Telematic Services

ISDN --- What It Is NOT

Not a sudden change of the entire system
- Primarily evolution of the existing systems
- Already here:
  - Digital Trunking
  - Digital Switches
  - The IDN
- Major changes yet to come:
  - Integrated and Digital Access
  - New Subscriber Access Protocols
  - Increased Subscriber Control Capabilities

Not a major change in Sub Telecom Services
- Ex: 32 kbps voice is not "ISDN"

ISDN Subscriber Services Available

Telecommunications

Telematic

ISDN Telecom Services Available

Switched Voice

Switched Digital

Dedicated Pt-Pt Lines

Packet Switched Digital -
- Dedicated Line Access
- Switched Line Access
- Shared Line Access

ISDN Telematic Services Available

Videotex

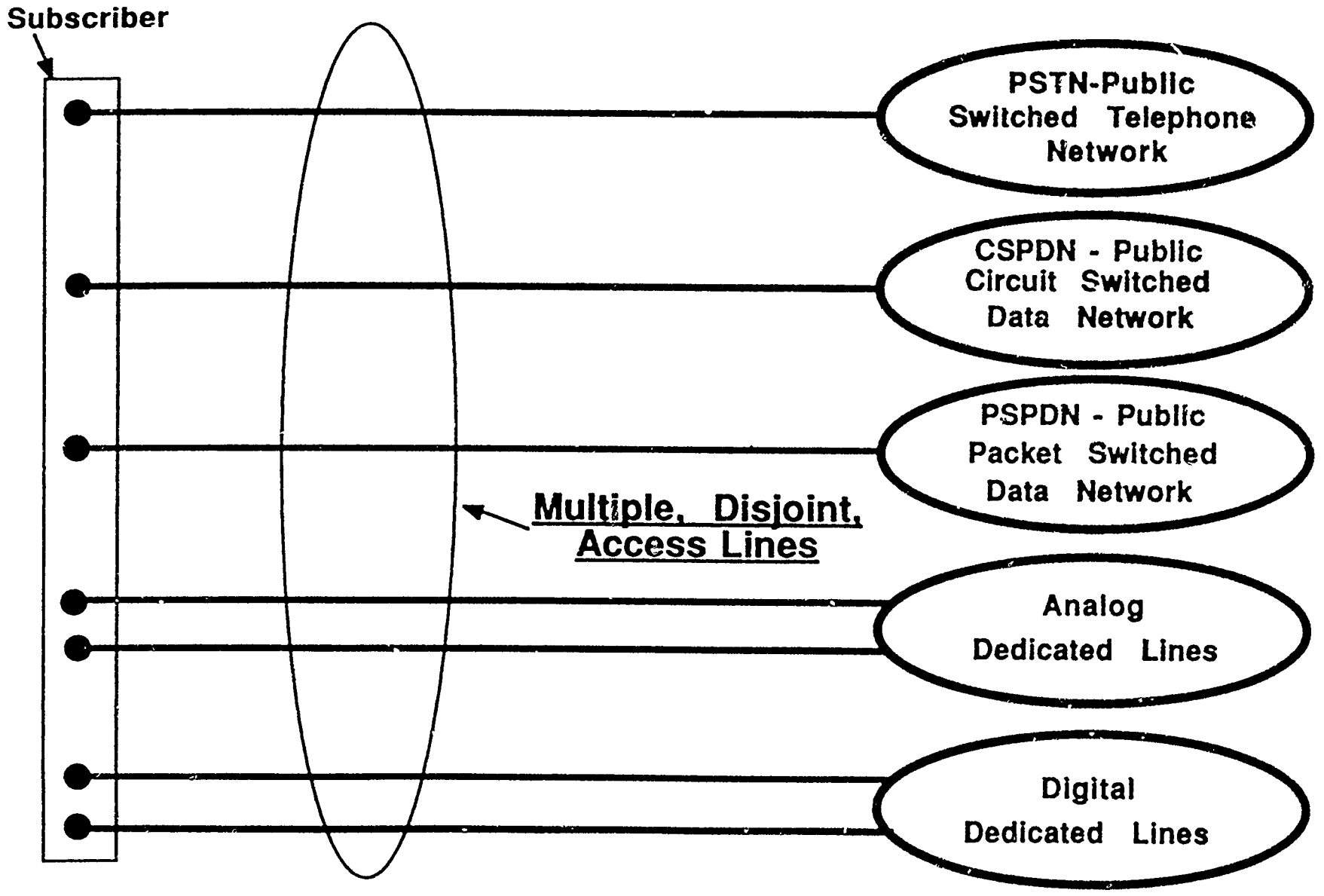
On-Line Data Bases

Major Changes in Subscriber Interface

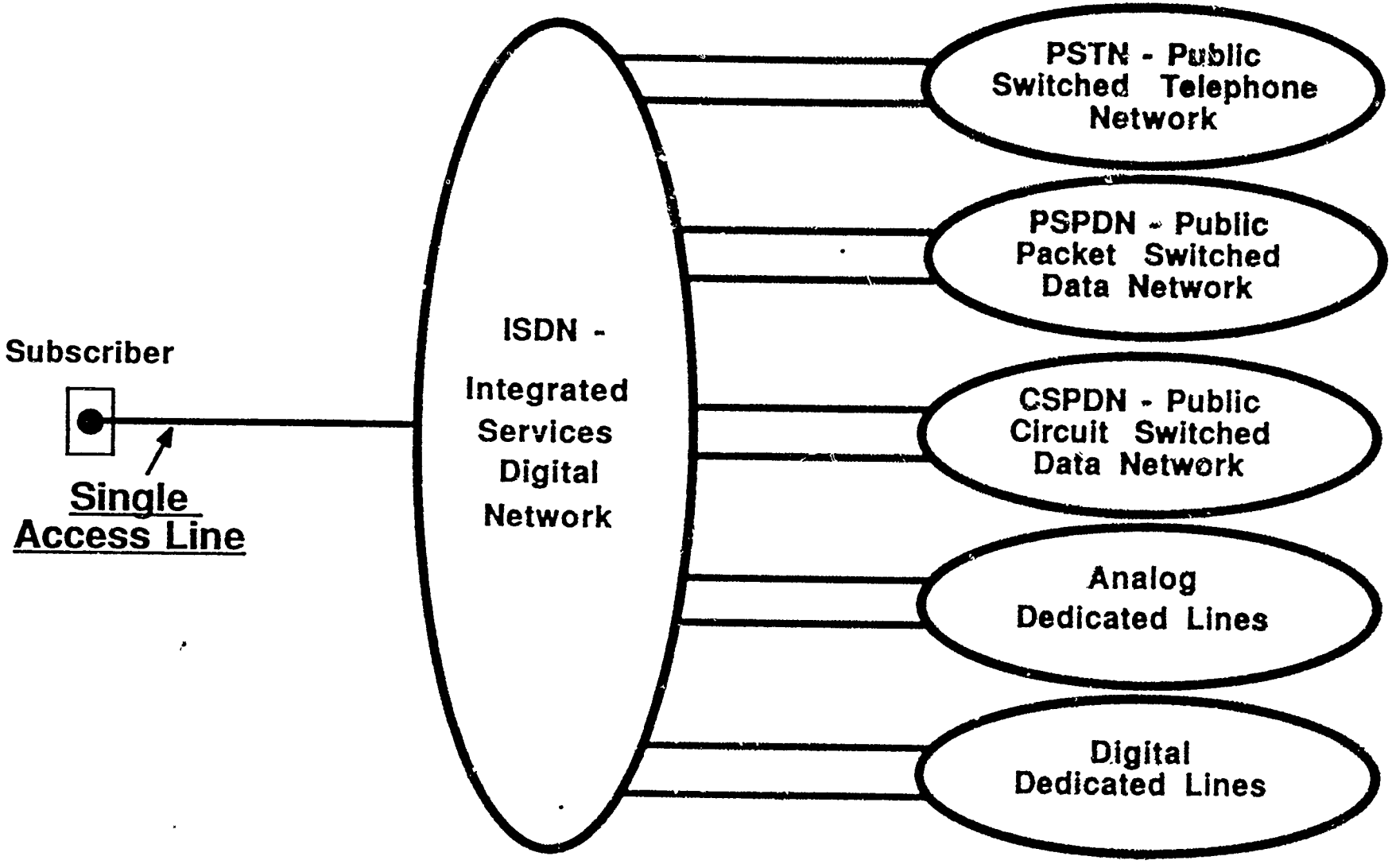
Delivery
- Uses existing 2-wire distribution loops
- Digital signal delivered to subscriber
- Multiple service channels over one physical path
- Variety of services available on each channel

Signaling and Control
- Out-of-Band (c.f. present In-Band)
- Shared Control Channel
- Increased control capabilities

Present Service Access



ISDN Service Access



The ISDN Subscriber Interfaces - Types of Channels and Their Uses

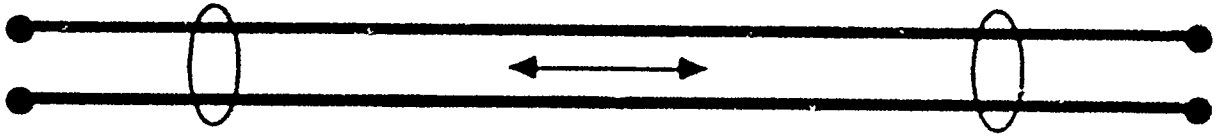
B - PCM Voice
Wideband speech (7 kHz)
Image (single frames)
Digital Data (to 64 kbps)
Subrate digital data (less than 64 kbps)

D - Signaling for B or Wideband Channels
Packet type data (as available)
Telemetry (as available)

H - High quality audio
Video
High speed digital data

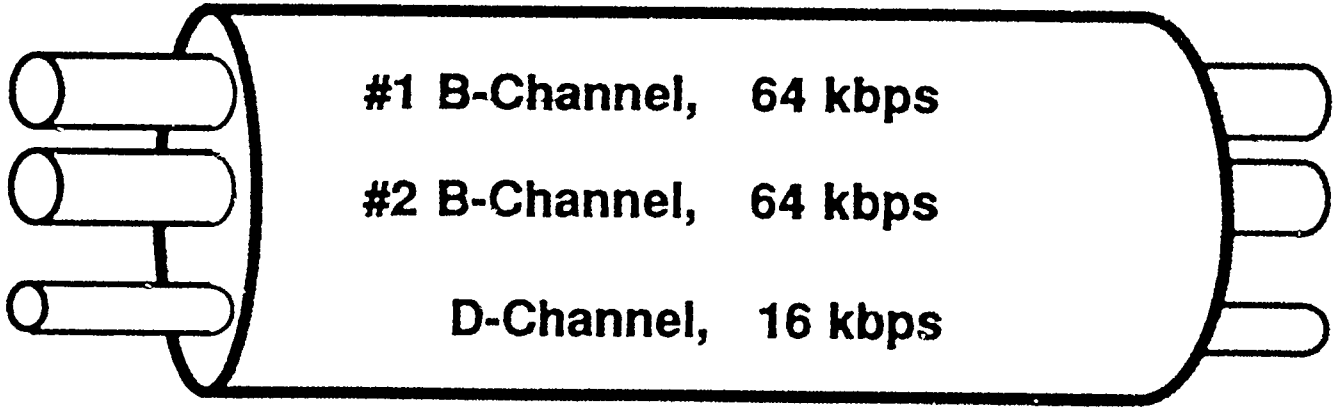
The ISDN Subscriber Interfaces - The Basic User Interface

Physical



One Pair, 144 Kbps, FDX(using echo cancelling)

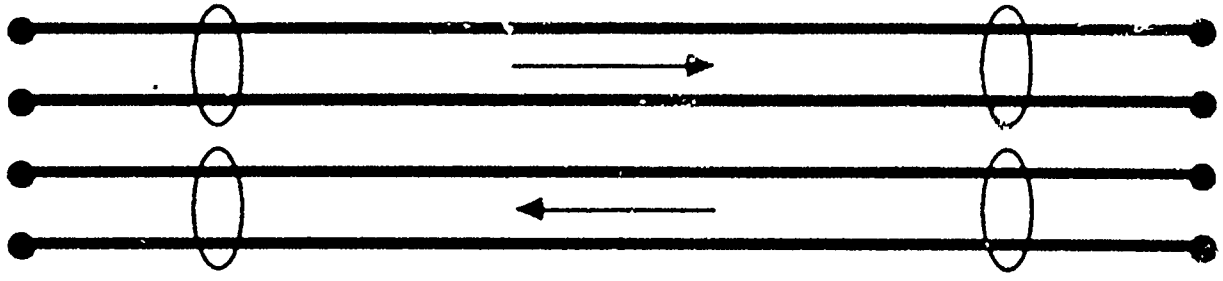
Logical



Multiple Service and Control Channels obtained using TDM (fixed) on the single physical circuit

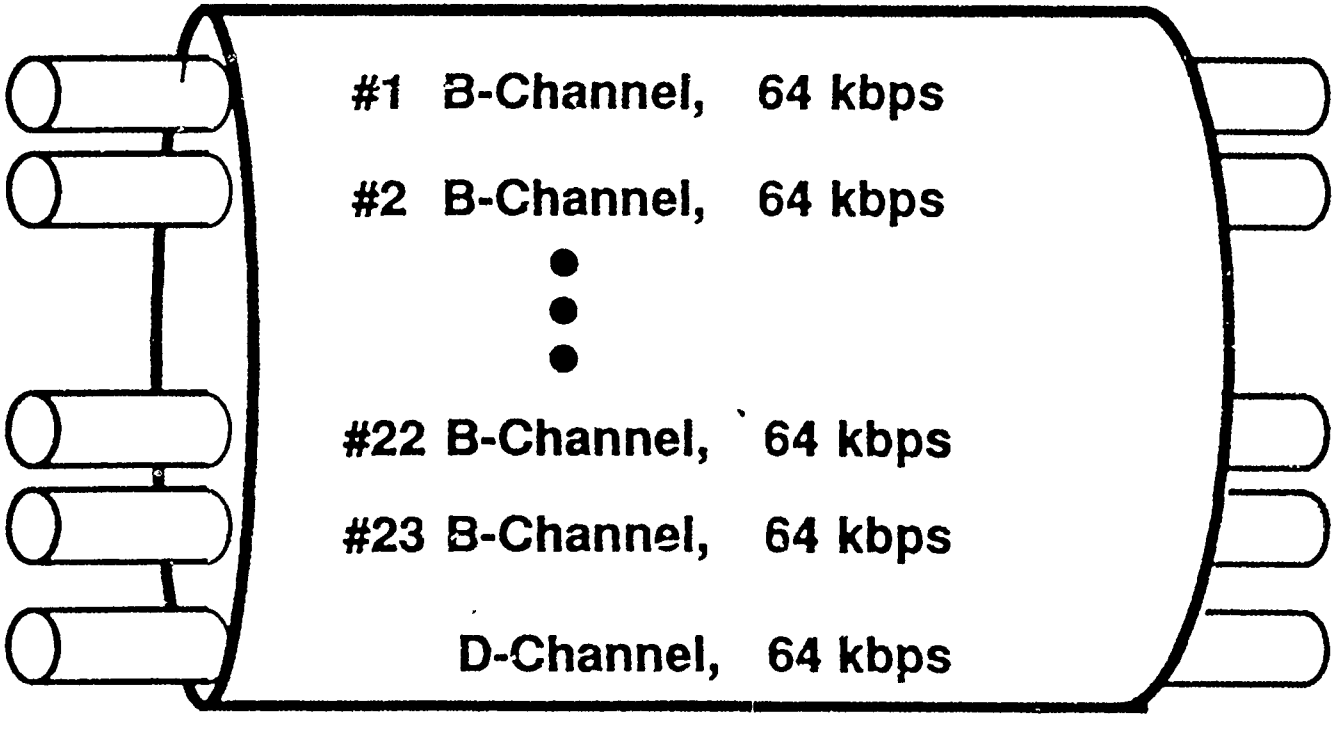
The ISDN Subscriber Interfaces - The Primary User Interface

Physical

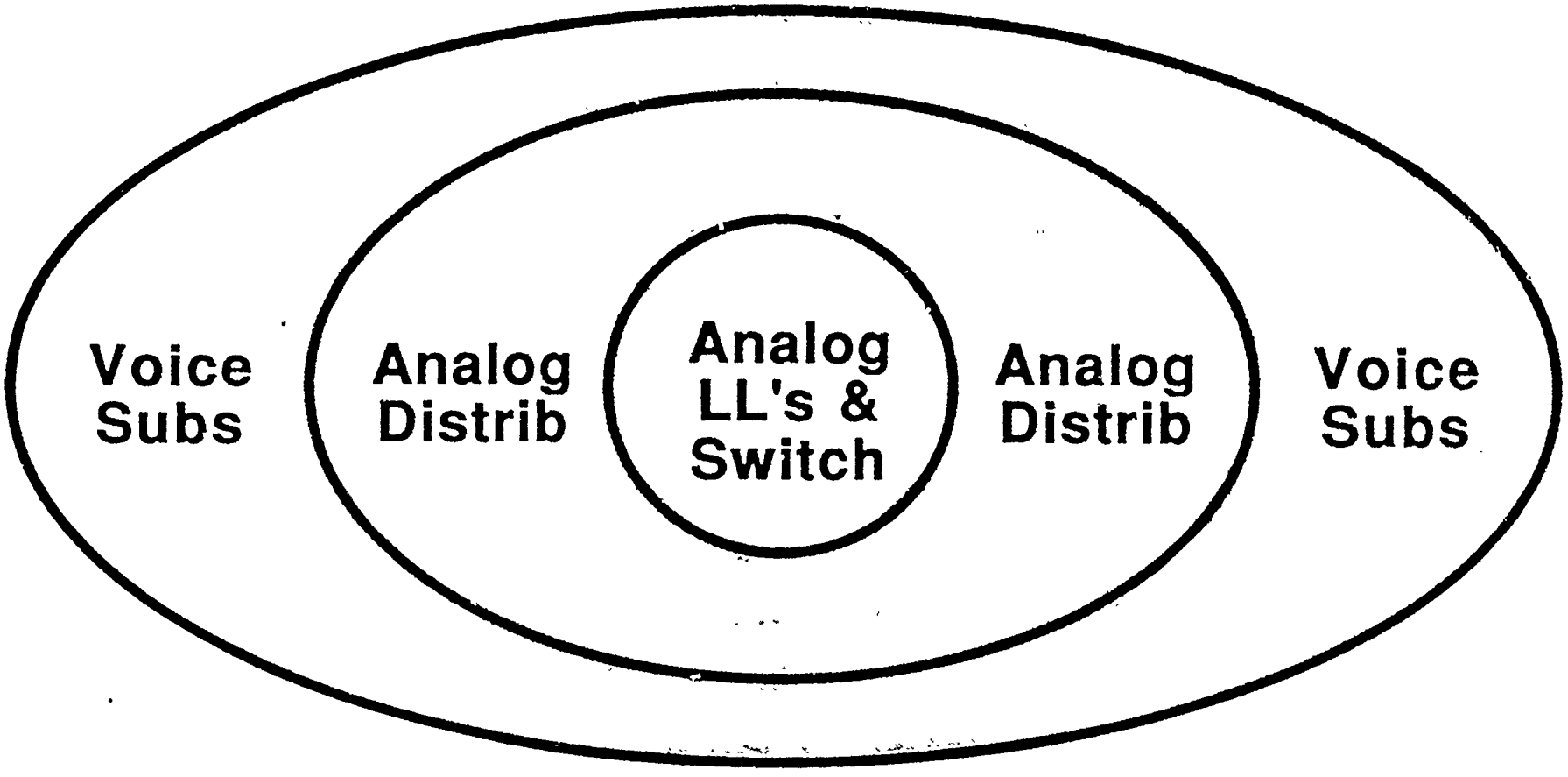


Two Pairs, each SX, 1.544 Mbps

Logical

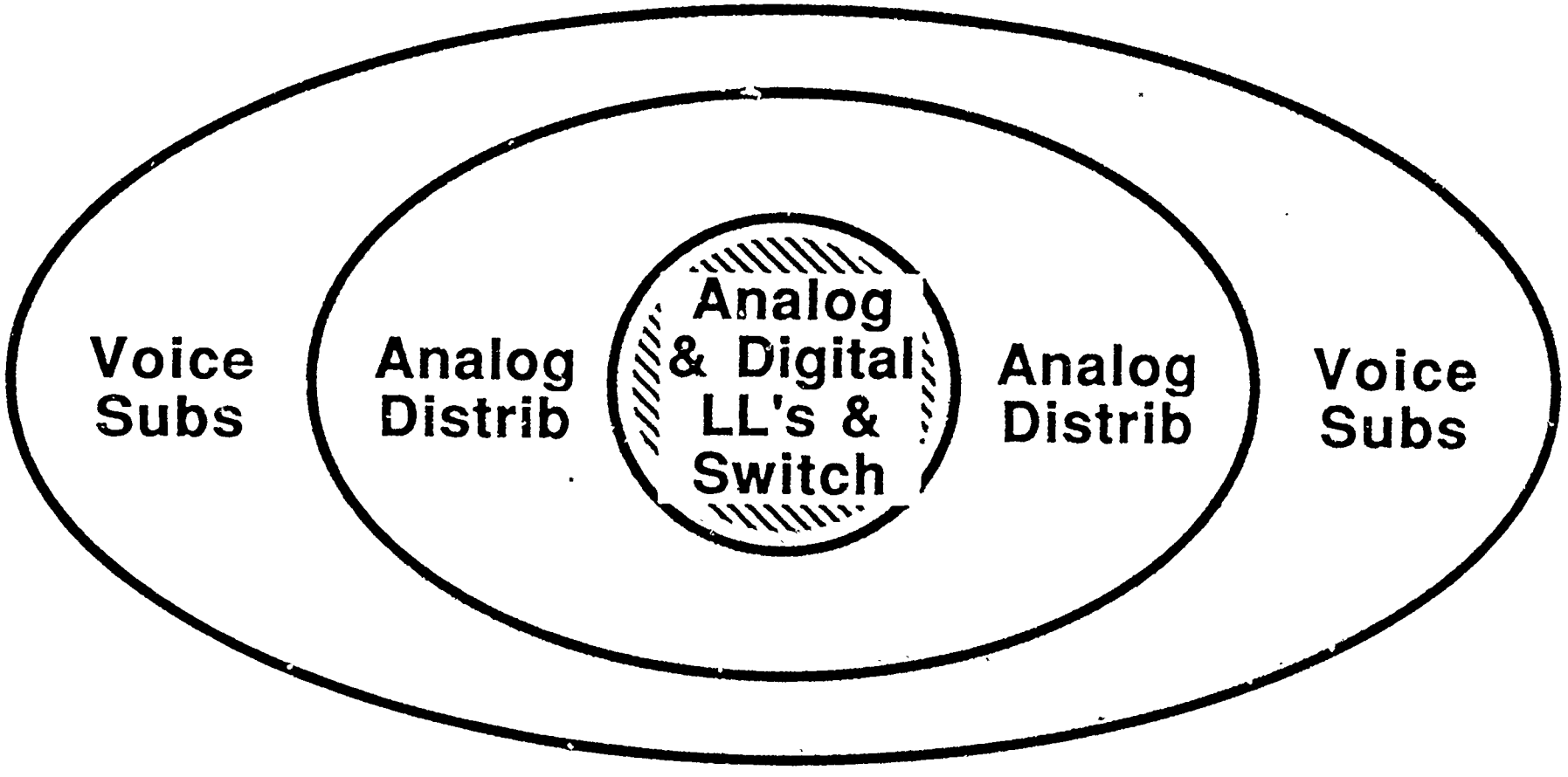


Putting ISDN Into Perspective
Its Evolution - Step 1



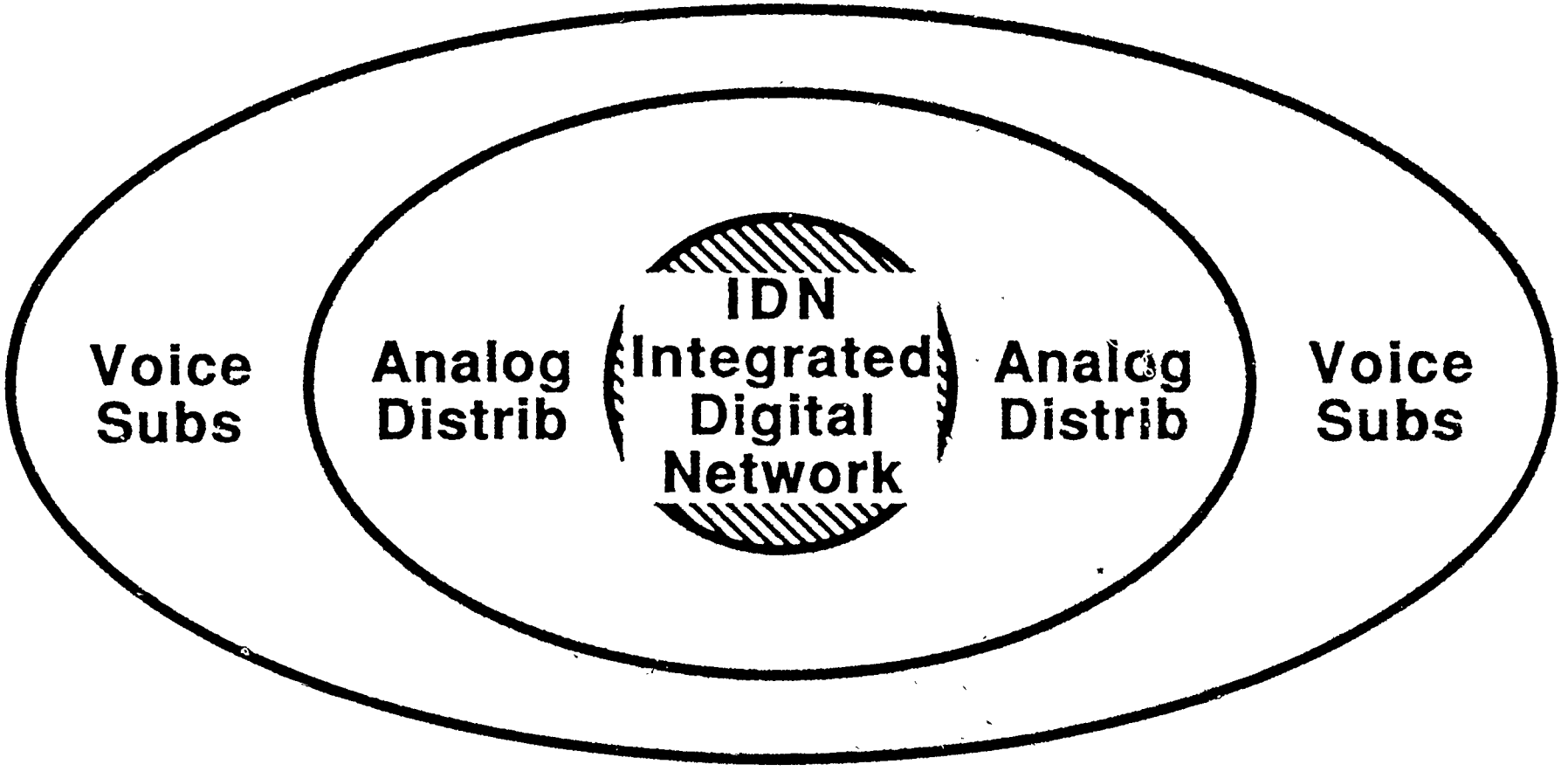
An All Analog Plant
(4kHz channels)

Putting ISDN Into Perspective
Its Evolution - Step 2



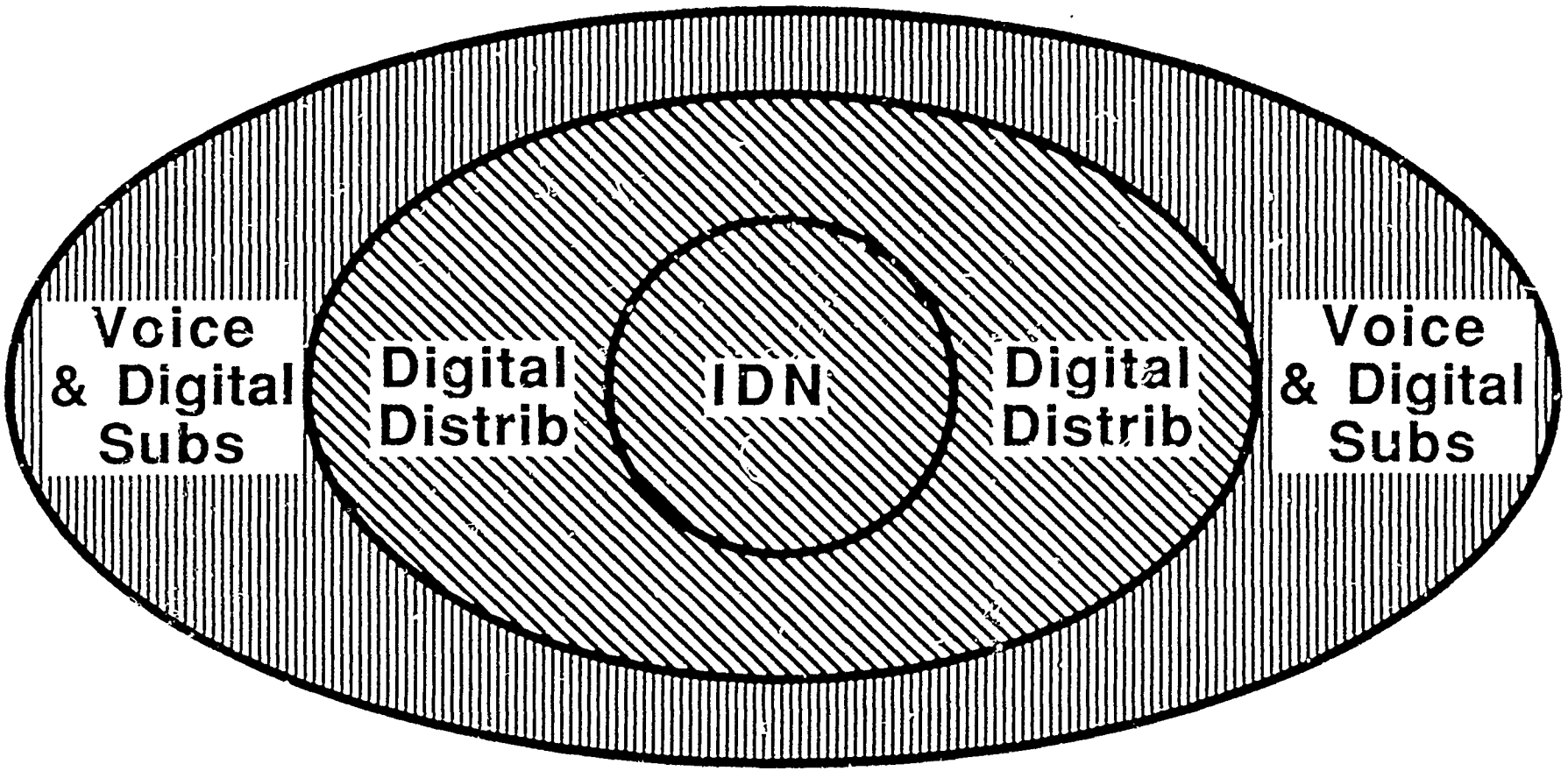
Introduction of Some Digital Subsystems (4 kHz & 64 kbps channels)

Putting ISDN Into Perspective
Its Evolution - Step 3



All Digital Except for Distribution (4kHz & 32/64 Kbps Channels)

Putting ISDN Into Perspective
Its Evolution - Step 4



"The ISDN"
(All 64kbps channels)

Putting ISDN Into Perspective
Comments on Results of Evolution

1. Voice orientation of most subsystems and the evolution results in service channels of 64 Kbps or multiples of 64 Kbps.
   For voice --- too big (for current voice tech)
   For data --- too small (for many new appls)

2. 32 kbps voice being introduced
   - Problems for use with some modems
   - Not an "ISDN" product but being "blamed" on ISDN

The "ISDN"

An Enhanced Capability Central Office

The ISDN is one of the major and critical components of the ISDN evolution

New capabilities required in the ISDN switch:

- Handle digital subscriber lines
- Handle user control
- Support shared use of the D-channel

Key ISDN Technologies

Digital Subscriber Lines
- Transmission Technology
- Processing Technology

User Interfaces

ISDN Switch --- Cost-Effective

Evolving to the ISDN Potential Problems

Definition of user interfaces

ISDN Compatable Subscriber Terminals

Attraction of Services Available

Local loop transmission capabilities

Tariffing and Charges

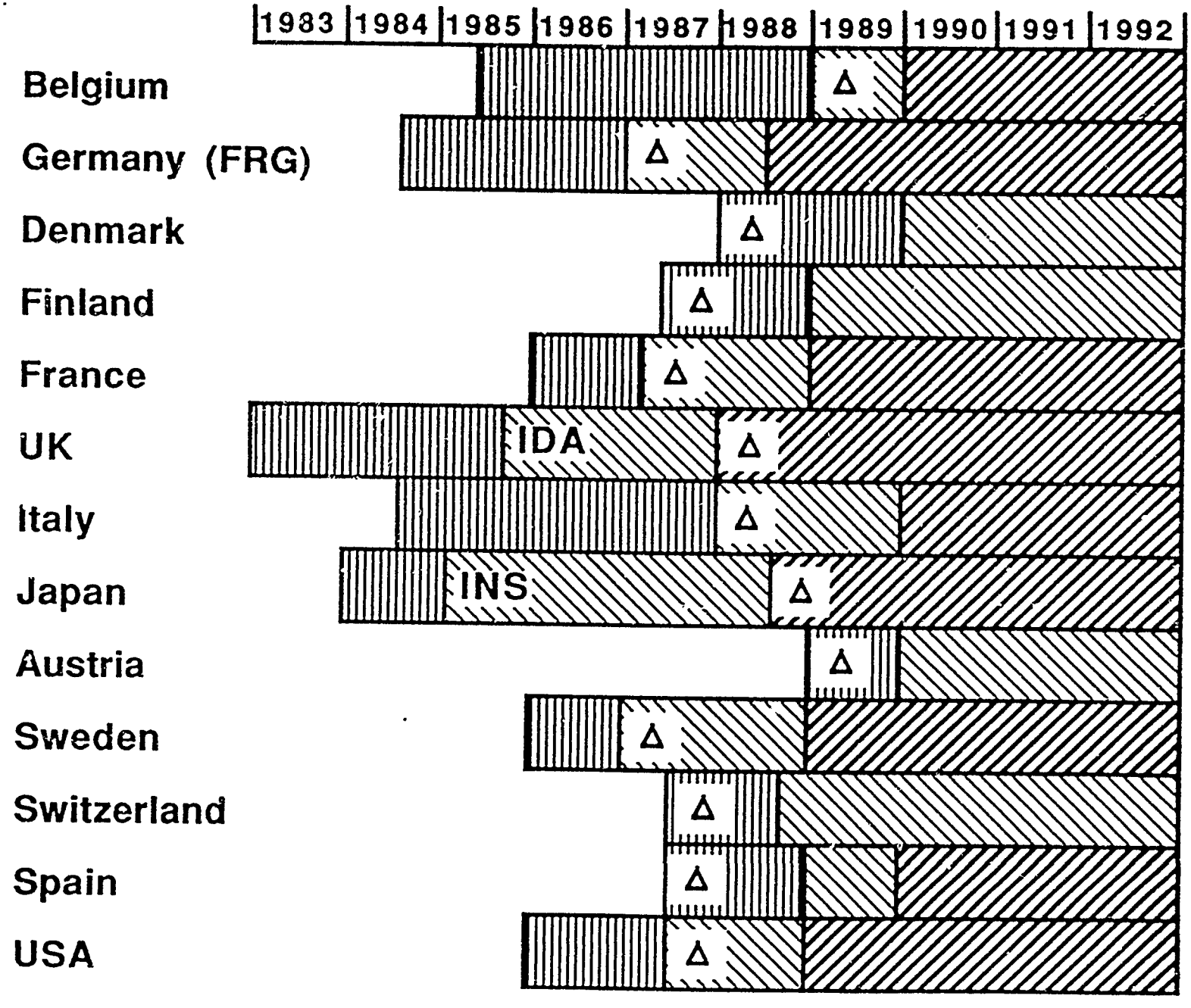
Signaling System #7 deployment

Termination of Primary Rate Access

Subrate multiplexing standards

Ability to insure 64 Kbps end-to-end

Introduction of ISDN

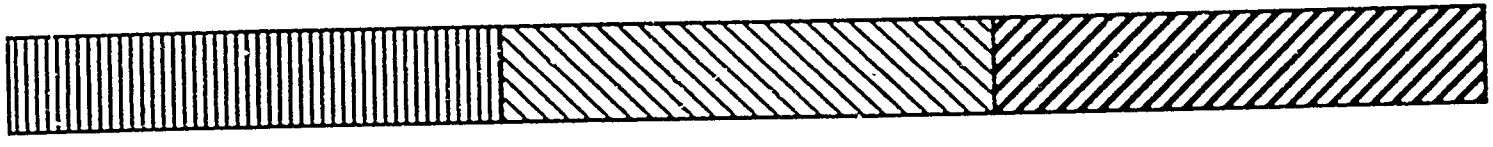


Introduction of ISDN (con't)

Δ ISDN according to CCITT basic access (B64 + B64 + D16) and primary rate access (30 X B64 + D64) or (23 X B64 + D64)

IDA Integrated digital access with B64 + B8 + D8

INS Information network system with B64 + B16 + D8



Preliminary Solution

Pilot Operation

Commercial Operation

ISDN --- Technical References

Ronayne, John, The Integrated Services Digital Network: from concept to application, Pitman, London, 1987

Stallings, William, ISDN: Technology, Applications, and Standards, Macmillam (to be publ), New York, 1988

When Will ISDN Be Available

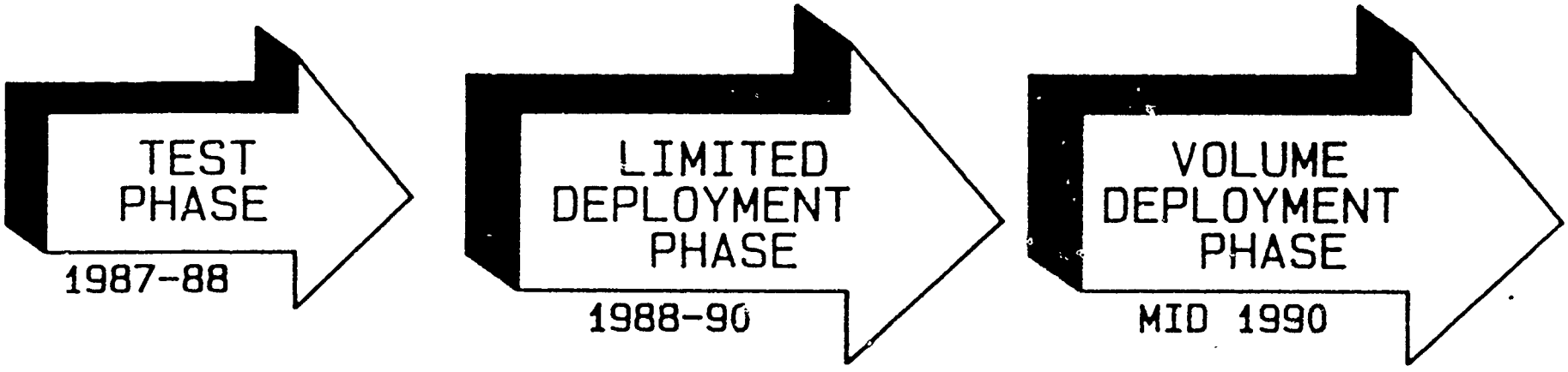
Mr. E. C. Whitehead, Bellsouth Services

WHEN WILL ISDN BE AVAILABLE?

E. C. (JIM) WHITEHEAD
BELLSOUTH SERVICES
MARKETING LINES OF BUSINESS
05/25/88

BellSouth

ISDN DEPLOYMENT STRATEGY



- Test Switches
- Position For ISDN
  - Market Pilots
  - Impact on Existing LOBs
  - Pricing Philosophy
  - Standards
  - Support Systems
- Sell Existing Services
- Market Driven Deployment
  - Metro
  - Ubiquity

ISDN DEPLOYMENT STRATEGY

- DEPLOYMENT IN THREE PHASES

  - TEST PHASE (1987-1988)

  GOAL: UNDERSTAND ISDN TECHNOLOGY AND CAPABILITIES OF THE ARCHITECTURE

  STRATEGY: T[illegible] INTERNALLY ALL S[illegible]CH TYPES

  TIMEFRAME: A[illegible] (TOCO HILLS) - MAY TO DEC 87
  SIEMENS (BOCA TEECA) - SEP 87 TO JUNE 88
  NTI (COURTLAND ST) - JULY TO DEC 88

ISDN DEPLOYMENT STRATEGY

- LIMITED DEPLOYMENT PHASE (1988-1990)

  GOALS: GIVE MARKETING DIRECTION TO TECHNOLOGY

  POSITION BELLSOUTH FOR ISDN

ISDN DEPLOYMENT STRATEGY

- LIMITED DEPLOYMENT PHASE
  STRATEGY: SELLING EXISTING TRANSITIONAL SERVICES

  IDENTIFY ISDN SERVICES AND MARKET NEEDS

  CONDUCT MARKET PILOTS

  ESTABLISH ISDN PRICING PHILOSOPHY

  TRAIN ON DATA

  IMPLEMENT STANDARDS

  PERFECT ISDN TECHNOLOGY

  MODIFY OSS TO SUPPORT ISDN

  DEVELOP METHODS & PROCEDURES

ISDN DEPLOYMENT STRATEGY

REASONS FOR LIMITED DEPLOYMENT:

- ISDN TECHNOLOGY WILL BE NON-STANDARD, VENDOR SPECIFIC AND PROTOTYPE IN NATURE
- LIMITED ISDN SERVICES AVAILABLE
- CPE WILL BE NON-STANDARD AND MAY HAVE TO BE CHANGED AFTER 1990
- SUPPORT SYSTEMS ARE NOT IN PLACE TO HANDLE THE ORDERING/PROVISIONING/ BILLING/MAINTENANCE ON A "FLOW THROUGH" BASIS

THESE LIMITATIONS MUST BE CORRECTED BEFORE VOLUME DEPLOYMENT CAN BEGIN.

ISDN DEPLOYMENT STRATEGY

- VOLUME DEPLOYMENT PHASE

GOALS: MEET CUSTOMER VOICE AND DATA NEEDS VIA ULTIMATE CONNECTIVITY-UBIQUITY

INCREASE REVENUES

IMPROVE NETWORK EFFICIENCY

IMPROVE NETWORK UTILIZATION

STRATEGY: DEPLOY ISDN AS RAPIDLY AS POSSIBLE CONSISTENT WITH THE BEST INTEREST OF THE CORPORATION AND CUSTOMER NEEDS

TIMEFRAME: BEGIN VOLUME DEPLOYMENT IN MID-1990

CRITERIA FOR VOLUME DEPLOYMENT

1. A STANDARD U-INTERFACE (THE CPE TO NETWORK INTERFACE).

2. FUNCTIONAL CALL CONTROL FOR BASIC CALL SET-UP (MESSAGE BASED RATHER THAN STIMULUS BASED).

3. CONTINUITY OF SERVICE (A METHOD IN PLACE WHICH PREVENTS A CUSTOMER FROM HAVING TO GIVE UP SERVICES THAT ARE CURRENTLY AVAILABLE TO HIM WHEN HE CUTS OVER TO ISDN).

4. CPE WHICH IS TRANSPORTABLE BETWEEN CENTRAL OFFICES AND SOFTWARE UPGRADABLE AS STANDARDS EVOLVE.

5. INTERWORKING CAPABILITIES AMONG ISDN ENTITIES AND WITH NON-ISDN NETWORKS SUCH AS CCS7, PULSELINK, INTELLIGENT NETWORKS, ETC.

6. ESTABLISHED OPERATIONS ENVIRONMENT TO SUPPORT END-TO-END ISDN SERVICES FOR ORDERING, PROVISIONING, BILLING AND MAINTENANCE ON A "FLOW THROUGH" BASIS.

7. AVAILABILITY OF SIGNALING SYSTEM 7 TO ENSURE THE INTERWORKING OF ISDN SERVICES BETWEEN ISDN CENTRAL OFFICES.

BELLSOUTH ISDN TECHNOLOGY

- DIGITAL C.O. CAPABILITY
  - 1987: 18% OF 1500 C.O.'S
  - 1990: 75% OF 1200 C.O.'S

- DIGITAL INTEROFFICE FACILITIES
  - 1987: 90%
  - 1990: 100%

- DIGITAL LOCAL LOOP CAPABILITY
  - 1987: 90%
  - 1990: 90%

CONCLUSION: MANY OF THE ISDN NETWORK PIECES ARE ALREADY IN PLACE.

ISDN STANDARDS ARE NOT ALL RESOLVED:

- SIGNALING FOR VERTICAL FEATURES
- PRIMARY RATE INTERFACE
- INTERWORKING WITH SS#7
- INTERWORKING WITH SNA
- UPGRADEABLE, TRANSPORTABLE CPE

MODIFICATION OF SUPPORT SYSTEMS

- ORDERING/PROVISIONING/BILLING AND MAINTENANCE SYSTEMS MUST HANDLE ISDN AS POTS IS TODAY

- ISDN COMPLICATES THE EQUATION

  - SEVERAL TYPE SWITCHES
  - MULTIPLE TELEPHONE NUMBER, TRANSMISSION CHANNELS AND SERVICES PER LINE
  - USAGE BILLING
  - ESSX, PULSELINK, ACCUPULSE AND SS#7 COMPLEXITY ROLLED INTO ONE LINE

- WE WILL PROVIDE NETWORK MANAGEMENT/MAINTENANCE

- SUPPORT SYSTEMS MODIFICATIONS MUST BE IN PLACE BY 1990

  - BELLSOUTH FUNDING OF ISDN ICRP
  - BELLCORE FUNDING OF NETWORK OSS
  - CUSTOMER WANTS CONTROL
  - WE WANT NETWORK BASED CONTROL BY USER

ISDN MARKETPLACE

- CUSTOMER NEEDS AND PERCEPTION OF ISDN

  - WHAT DOES THE ARMY AND OTHER CUSTOMERS NEED?

    . COMMON INTERFACE TO VOICE/DATA SERVICES
    . HIGH CONNECTIVITY (ANY CPE TO ANY HOST)
    . ERROR FREE DATA TRANSMISSION
    . NETWORK MANAGEMENT AND CONTROL (BANDWIDTH, MOVES, CHANGES, SERVICES)
    . IMPROVED PRICE PERFORMANCE (REDUCE PRICE OR ADD VALUE)
    . INTERWORKING ISDN AND NON-ISDN SERVICES
    . VALUE ADDED DATA TRANSPORT SERVICES

  - HOW DOES THE MARKETPLACE PERCEIVE ISDN?

    . CONFUSION ON WHAT IT IS, AVAILABILITY, BENEFITS, COSTS
    . EXTENSION OF EXISTING PRODUCTS (ESSX, DATA) AT LOWER COSTS
    . WOULD LIKE ONE VENDOR TO TAKE CARE OF THEIR CPE, SNA, DATA TRANSPORT SERVICES

ISDN MARKETPLACE (CONTINUED)

- ISDN WILLINGNESS-TO-PAY

  SEVERAL ISDN CUSTOMERS OR PROSPECTIVE CUSTOMERS WERE ASKED ABOUT THEIR WILLINGNESS-TO-PAY FOR ISDN BASED SERVICES:

  - ANSWERS RANGED FROM 1.2 TIMES TO 3 TIMES CURRENT LINE CHARGES
  - "1.5 TIMES" FIGURE HAS BEEN DISCUSSED THROUGHOUT OUR INDUSTRY
  - BOTTOM LINE IS THAT CUSTOMERS EXPECT TO SAVE MONEY WITH ISDN
    - LOWER TELEPHONE BILL
    - IMPROVED PRODUCTIVITY
    - ADDED VALUE TO BUSINESS OPERATIONS

- WHAT ARE THE CUSTOMER APPLICATIONS FOR ISDN?

  - DATA TRANSPORT
    - PC TO PC
    - PC TO HOST/SERVER
    - HOST TO HOST
    - LOCAL LANS TO THE WORLD

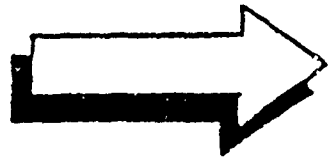
ISDN MARKETPLACE (CONTINUED)

- USER ACCESS SECURITY
- ELECTRONIC MAIL WITH GRAPHICS
- FAST FAX
- VOICE/DATA CONFERENCE CALLING
- POINT OF SALE (VERIFICATION, INVENTORY)
- AUTOMATIC CUSTOMER RECORD RETRIEVAL
- CAD/CAM/CAE IMAGE TRANSFER
- STILL FRAME VIDEO (PHOTOS, X'RAYS)
- BROADBAND ISDN
  - HDTV
  - FULL MOTION TELECONFERENCING
  - VIDEO CATALOGUES
  - VIDEO TROUBLE SHOOTING

INTEGRATED SERVICES DIGITAL NETWORK
TRANSITION TO IDS

TRANSITION SERVICES

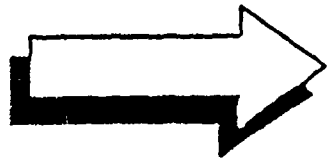
- BSSX®
- 1FB / 1FR
- PBX Trunks
- Megalink™ CS
- MAN, DS3



IDS CLASSES OF SERVICE

- Business Group Voice/Data
- Single Line Voice/Data
- PBX Trunk Voice/Data
- Primary Rate Voice/Data
- Broadband Voice/Data/Video

- Analog Voice
- AccuPulse™
- SynchroNet®
- Dial Up Data
- PulseLink®
- PulseLink®
- DS3



IDS SERVICE OPTIONS

- Digital Voice
- 64 KBPS Circuit Switched Data
- 64 KBPS Private Line Service
- Low Speed Modem Data
- High Speed Packet Data
- Low Speed Packet Data
- Video

FEATURES AND FEATURE ALTERNATIVES

User To User Signaling + Many More

INFORMATION SERVICES

- TUG Gateway
- Voice Messaging
- Pay Per View
- Electronic Mail

CPE

HIGHLIGHTS OF BELLSOUTH'S LIMITED DEPLOYMENT ACTIVITIES

- DUNWOODY 5ESS, ATLANTA - MARCH 1988

  - CUSTOMERS: PRIME COMPUTER
    -25 BASIC RATE INTERFACE LINES
    -1 PRIMARY RATE INTERFACE LINE

    HAYES MICROCOMPUTER PRODUCTS
    -35 TO 48 BASIC RATE LINES

    AT&T SOUTHEAST REGION OPERATIONS
    -400 BASIC RATE LINES

    TRUST COMPANY OF GEORGIA
    -50 BASIC RATE LINES

    CONTEL NATIONAL HEADQUARTERS
    -10 BASIC RATE LINES

HIGHLIGHTS OF BELLSOUTH'S LIMITED DEPLOYMENT ACTIVITIES

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    -50 BASIC RATE LINES

    CONTEL NATIONAL HEADQUARTERS
    -10 BASIC RATE LINES

CAHABA HEIGHTS 5ESS, BIRMINGHAM - 4Q88

- CUSTOMERS: BELLSOUTH SERVICES
  HEADQUARTERS SOUTH
  CENTRAL BELL OPERATIONS - ALABAMA
  -300 BASIC RATE LINES

- CUSTOMER APPLICATIONS

  - OFFICE AUTOMATION
  - INTEGRATED VOICE/DATA
  - FILE TRANSFER
    - PC TO PC
    - PC TO HOST
    - HOST TO HOST
  - ORDER ENTRY
  - NETWORK MANAGEMENT
  - RESEARCH AND DEVELOPMENT
  - SLOW SCAN VIDEO
  - STILL FRAME VIDEO
  - RESIDENCE "WORK AT HOME" DATA NETWORKING
  - USER TO USER SIGNALING

- ISDN CAPABILITIES/SERVICE OPTIONS

  - BASIC AND PRIMARY RATE
  - BUSINESS GROUP VOICE
  - SINGLE LINE VOICE
  - 64 KBPS CIRCUIT SWITCHED DATA
  - LOW SPEED PACKET SWITCHED DATA, D CHANNEL
  - LOW SPEED MODEM POOL DATA
  - HIGH SPEED PACKET SWITCHED DATA
  - USER TO USER SIGNALING, D CHANNEL

THE HEATHROW DEVELOPMENT DMS100, LAKE MARY (ORLANDO), FLORIDA 3Q88

- CUSTOMER: A JOINT VENTURE BETWEEN SOUTHERN BELL AND HEATHROW LAND AND DEVELOPMENT COMPANY

- OBJECTIVE: OFFER ADVANCED STATE OF THE ART COMMUNICATIONS NETWORK AND SERVICES FOR A PLANNED COMMUNITY

-RESIDENTIAL	3,470 UNITS
-BUSINESS	4.2M SQUARE FEET OFFICE COMPLEX
-COMMERCIAL	CONFERENCE CENTER WITH 3 HOTELS
-RETAIL	155K SQUARE FEET SHOPPING CENTER

THE HEATHROW DEVELOPMENT (CONTINUED)

- **HEATHROW SERVICE OFFERINGS**

  - RESIDENTAL: BASIC AND PRIMARY ISDN CAPABLITIES/SERVICES

    SECURITY MONITORING/ALARM

    CATV SERVICES

    BROADBAND ISDN SERVICES
    - HDTV
    - STEREO/HIFI AUDIO
    - TELECONFERENCING VIDEO

    RECREATIONAL SERVICES
    - DOWNLOADING VCR
    - ON SITE SPORTS EVENTS

    HOME BANKING

    ENERGY MANAGEMENT

    METER READING

    ACCESS TO DATA NETWORKING
    - INFORMATION SERVICES
    - WORK AT HOME

    TRIAL SITE FOR NEW SERVICES

THE HEATHROW DEVELOPMENT (CONTINUED)

- **COMMERCIAL**

ADVANCED CONFERENCE CENTER FACILITIES
- REMOTE TRANING CLASSES FROM COLLEGE
- HOTEL CONFERENCING PACKAGE
- SECURITY, ALARM, ENERGY MANAGEMENT
- BASIC, PRIMARY, BROADBAND ISDN CAPABILITIES/SERVICES

- **BUSINESS**

BASIC, PRIMARY, BROADBAND ISDN CAPABILITIES/SERVICES

EXISTING ESSX AND DATA TRANSPORT SERVICES

SECURITY AND ALARM

CARD ACCESS CONTROL THROUGHOUT CENTER

WORK AT HOME CAPABILITY - "HOME OFFICE"

T-1 AND FIBER INTERCONNECTS TO BUSINESSES

VIDEO CONFERENCING CAPABILITIES

TRIAL SITE FOR NEW BUSINESS SERVICES

- **RETAIL**

CONNECTIONS FOR HOME SHOPPING AND HOME BANKING

BENEFITS FOR THE US ARMY

- STANDARD CPE INTERFACE (SINGLE INFORMATION OUTLET)
- VOICE, DATA, IMAGE SERVICES OVER THE SAME LINE
- ULTIMATE CONNECTIVITY (ANY TERMINAL TO ANY DATA BASE/HOST)
- END TO END DIGITAL NETWORK (HIGHER SPEEDS, GREATER ACCURACY)
- TRANSPORT OF HUMAN TO COMPUTER INTERACTIONS
- DATA NETWORKING TO COMMUNITY OF INTEREST VIA COST EFFECTIVE PUBLIC NETWORK
- REAL TIME CUSTOMER CONTROL (MOVES, CHANGES, REARRANGEMENTS)
- IMPROVED PRODUCTIVITY
- ELIMINATION OF LANS AND COAXIAL CABLE

SOME OBSERVATIONS AND CONCLUSIONS ON ISDN

- ISDN CAN BECOME THE "DATA NETWORKING" BACKBONE THAT CONNECTS LARGE BUSINESSES WITH THEIR COMMUNITY OF INTERESTS VIA THE PUBLIC SWITCHED NETWORK

- ISDN CAN BRING DATA CAPABILITY TO SMALL BUSINESSES AND RESIDENCE CUSTOMERS WHO CANNOT AFFORD PRIVATE LINE SERVICES

- ISDN CAN SMOOTH THE WAY FOR GROWTH OF THE INFORMATION SERVICES ERA

- ISDN CAN EVOLVE INTO A WORLDWIDE NETWORK AND STANDARD

- ISDN CAN ENABLE INNOVATION IN THE COMPUTER/TELECOMMUNICATIONS INDUSTRY AS CUSTOMERS IDENTIFY NEW APPLICATIONS, AND MANUFACTURERS ENHANCE TECHNOLOGY

SOME OBSERVATIONS AND CONCLUSIONS ON ISDN (CONTINUED)

- ISDN TECHNOLOGY WILL BE DRIVEN MORE AND MORE BY THE MARKET PLACE UNTIL THE "RIGHT" BALANCE IS ACHIEVED TO PRODUCE
  - VALUE ADDED SERVICES
  - PRICE PERFORMANCE
  - MARKET OPPORTUNITIES
- BELLSOUTH IS BRINGING MARKETING AND TECHNOLOGY TOGETHER

Army Telephone Communications and ISDN

Capt. Mark Corzine, U.S. Army, PM Switched Systems

PM SWITCHED SYSTEMS

ARMY

TELEPHONE

COMMUNICATIONS

AND

ISDN

GOOD MORNING. I AM CAPTAIN MARK CORZINE, PROJECT OFFICER FOR THE CONUS TELEPHONE MODERNIZATION PROGRAM. I AM ASSIGNED TO THE PROGRAM MANAGER FOR DEFENSE COMMUNICATIONS AND ARMY SWITCHED SYSTEMS AND TO THE PROGRAM EXECUTIVE OFFICE, NETWORKS LOCATED AT FORT MONMOUTH, NJ. THIS MORNING I HAVE BEEN REQUESTED TO PROVIDE AN OVERVIEW ON THE ARMY'S PLAN FOR TELEPHONE COMMUNICATION UPGRADE AND THE TRANSITION TO ISDN.

PM SWITCHED SYSTEMS

ARMY TELEPHONE SYSTEM UPGRADES

- EUROPEAN TELEPHONE SYSTEM
- KOREA TELEPHONE UPGRADE
- CONUS TELEPHONE MODERNIZATION
- JAPAN TELEPHONE UPGRADE
- PANAMA TELEPHONE UPGRADE

THE ARMY HAS FIVE MAJOR PROJECTS TO UPGRADE COMMUNICATIONS THROUGHOUT THE WORLD. I WILL ONLY ADDRESS THE CONUS TELEPHONE MODERNIZATION PROGRAM; KNOW AS "CTMP".

PM SWITCHED SYSTEMS

CONUS TELEPHONE MODERNIZATION PROGRAM

- REPLACE OBSOLETE TELEPHONE TECHNOLOGY
- PROVIDE DIGITIAL VOICE AND DATA CAPABILITY
- PROVIDE MODERN TELEPHONE FEATURES

CTMP IS A MULTIYEAR PROGRAM DIRECTED TOWARDS THE MODERNIZATION OF OBSOLETE 1950 VINTAGE ELECTROMECHANICAL TELEPHONE SWITCHING TECHNOLOGY AT APPROXIMATELY 100 US ARMY POST, CAMPS AND STATIONS THROUGHOUT THE CONTINENTAL UNITED STATES.

THESE EXISTING TELEPHONE FACILITIES HAVE LONG OUTLIVED THEIR EXPECTED 20 YEAR SERVICE LIFE, RESULTING IN THE INABILITY TO ADEQUATELY PROVIDE MODERN DIGITAL VOICE, DATA AND VIDEO COMMUNICATIONS AND MODERN TELEPHONE FEATURES THAT THE ARMY USERS REQUIRE.

CTMP 83

ROCK ISLAND ARSENAL, IL	ATT	SYS 85
FT McPHERSON, GA	SOTHERN BELL	SL-100
ABERDEEN PG, MD	GTE	GTD-5MV
FT DRUM, NY	ATT	SYS-85
PICATINNY ARSENAL, NJ	GTE	GTD-5MV

CTMP 84

WEST POINT, NY	ATT	SYS-85
LETTERKENNY AD, PA	NTI	SL-100
FT JACKSON, NC	NTI	SL-100
PRESIDIO OF MONTEREY, CA	NTI	SL-1
FT STEWART, GA	NTI	SL-1
FT MONROE, VA	NTI	SL-1
FT BRAGG, NC	GTE	GTD-5MV
FT GORDON, GA	GTE	GTD-5MV
ANNISTON AD, AL	SOUTH CENTRAL BELL	SL-100

THE ARMY HAS 51 OF THE 100 SITES ON CONTRACT. THESE NEXT THREE SLIDES SHOW THE ACQUISITION YEAR, SITE, CONTRACTOR AND THE TELEPHONE SYSTEM.

IN CTMP 83 THROUGH 85 ACQUISITION WAS FOR VOICE ONLY SWITCHES. CTMP 86 ACQUISITION WAS THE FIRST YEAR FOR INTEGRATED VOICE AND DATA (IVD). I WILL ADDRESS THE CTMP 87 ACQUISITION IN A LATER SLIDE.

PM SWITCHED SYSTEMS

CTMP 85

FT LEWIS, WA	NTI	SL-100
FT ORD, CA	NTI	SL-100
FT BLISS, TX	NTI	SL-100
HUNTER AAF, GA	NTI	SL-100
NCAD, PA	NTI	SL-100
FT MONMOUTH, NJ	NTI	SL-100
WHITE SANDS MR, NM	NTI	SL-100
SACRAMENTO AD, CA	NTI	SL-1
SENECA AD, NY	NTI	SL-1
WATERVLIET ARS, NY	NTI	SL-1
DUGWAY PG, UT	TELEX	UDX-5000
TOOELE PG, UT	TELEX	UDX-5000

CTMP 86

FT CAMPBELL, KY	GTE	GTD-5
FT KNOX, KY	GTE	GTD-5
FT BENNING, GA	GTE	GTD-5
FT McCLELLAN, AL	GTE	GTD-5
SAVANNA AD, IL	GTE	GTD-5
FT RILEY, KS	GTE	GTD-5
SIERRA AD, CA	GTE	GTD-5
McALESTER AAP, OK	GTE	GTD-5
RED RIVER AD, TX	GTE	GDT-5
PRESIDIO OF SAN FRANCISCO, CA	GTE	GTD-5
VINT HILL , VA	R&E ELECTRONICS	GTD-5

CTMP 87

FT GREELY, AK	BELL SOUTH	SL-100
FT RICHARDSON, AK	BELL SOUTH	SL-100
FT WAINWRIGHT, AK	BELL SOUTH	SL-100
PUEBLO AD, CO	BELL SOUTH	SL-100
YUMA PG, AZ	BELL SOUTH	SL-100
FT SAM HOUSTON, TX	BELL SOUTH	SL-100
FT RITCHIE, MD	ATT	SYS-85
JEFFERSON PG, IN	ATT	SYS-85
EDGEWOOD ARSENAL, MD	ATT	SYS-85
FT PICKETT, VA	ATT	SYS-85
FT A P HILL, VA	ATT	SYS-85
FT McCOY, WI	ATT	SYS-85

CTMP 87 ACQUISITION

- ISDN REQUIREMENT
  - STANDARD ISDN 1991/1992
  - PROPRIETARY ISDN
  - HIGH COST
- WITHDRAW ISDN
- IVD REQUIREMENT

THE CTMP 87 ACQUISITION ORIGINALLY HAD ISDN AS A REQUIREMENT. DURING THE PROPOSAL EVALUATIONS IN AUGUST 1987, THE MAJOR SWITCH VENDERS STATED THAT STANDARDIZED ISDN WOULD NOT BE AVAILABLE UNTIL LATE 1991/EARLY 1992. THESE VENDERS PROPOSED THEIR PROPRIETARY ISDN; TO INCLUDE THE 2 WIRE "U" INTERFACE, TERMINAL ADAPTERS, 2B1Q CODING AND ISDN VOICE AND DATA TERMINALS. WE FOUND THAT THIS APPROACH WAS TECHNICALLY TOO COSTLY.

THE ARMY DECIDED TO WITHDRAW THE ISDN REQUIREMENT UNTIL ISDN WAS OFF THE SHELF AND ECONOMICALLY AVAILABLE. THE ISDN REQUIREMENT WAS REPLACED WITH IVD REQUIREMENT.

ISDN PROBLEM AREAS

- NO ISDN STANDARDS (CCITT AND NORTH AMERICAN)
- COMMON CHANNEL SIGNALING #7
- STANDARD 2 WIRE "U" INTERFACE
- STANDARD TERMINAL ADAPTERS
- STANDARD ISDN VOICE AND DATA TERMINALS
- UPGRADABILITY OF CURRENT SWITCHES TO ISDN

UNDER THE CURRENT PLANS, IT WILL TAKE IVE MORE ACQUISITION YEARS TO UPGRADE ALL OF THE PROGRAMMED 100 INSTALLATIONS. INDUSTRY HAS NOT ESTABLISHED ISDN STANDARDS (CCITT BLUE BOOK AND NORTH AMERICAN STANDARDS) AND COMMON CHANNEL SIGNALING #7. ALSO THE PRIME SWITCH VENDERS NEED TO HAVE A STANDARD 2 WIRE "U" INTERFACE, TERMINAL ADAPTERS, AND ISDN VOICE AND DATA TERMINALS. ONCE THE 100 INSTALLATIONS ARE UPGRADED, THEN THE ARMY WILL RETURN TO THE EARLY SITES AND UPGRADE THEM TO ISDN.

AT THIS TIME THE PRIME SWITCH VENDERS ARE UNABLE TO PROVIDE THE ARMY WITH INFORMATION ON WHAT IT WILL TAKE TO UPGRADE THEIR SWITCHES TO THE ISDN STANDARD.

TODAY, IVD IS HANDLING THE USERS ON POST REQUIREMENTS. AS THE USERS NETWORK REQUIREMENTS GROW, WE WILL LOOK TO ISDN TO SATISFY THESE REQUIREMENTS.

CONCLUSION

- CONTINUE UPGRADES TOWARDS ISDN
- REQUIRE ISDN STANDARDS
- REQUIRE A COST EFFECTIVE ISDN SWITCHING SYSTEM

THE ARMY WILL CONTINUE UPGRADES TOWARDS ISDN BY SOLICITING INDUSTRY FOR ISDN IN THE NEXT ACQUISITION. THE ARMY REQUIRES FIRM ISDN STANDARDS AND A COST EFFECTIVE ISDN SWITCHING SYSTEM. IF THESE ARE NOT AVAILABLE, THEN THE ARMY WILL REDUCE THE REQUIREMENTS TO IVD.

INSTALLATION INFORMATION SYSTEM IMPROVEMENT PROGRAM

(IISIP)

IISIP PROGRAM

- PROVIDE STANDARD INFORMATION TRANSFER SYSTEMS
- MAXIMUM USE OF FIBER OPTICS
- SUPPORT TRANSITION TO ISDN

IISIP ENGINEERING SUPPORT

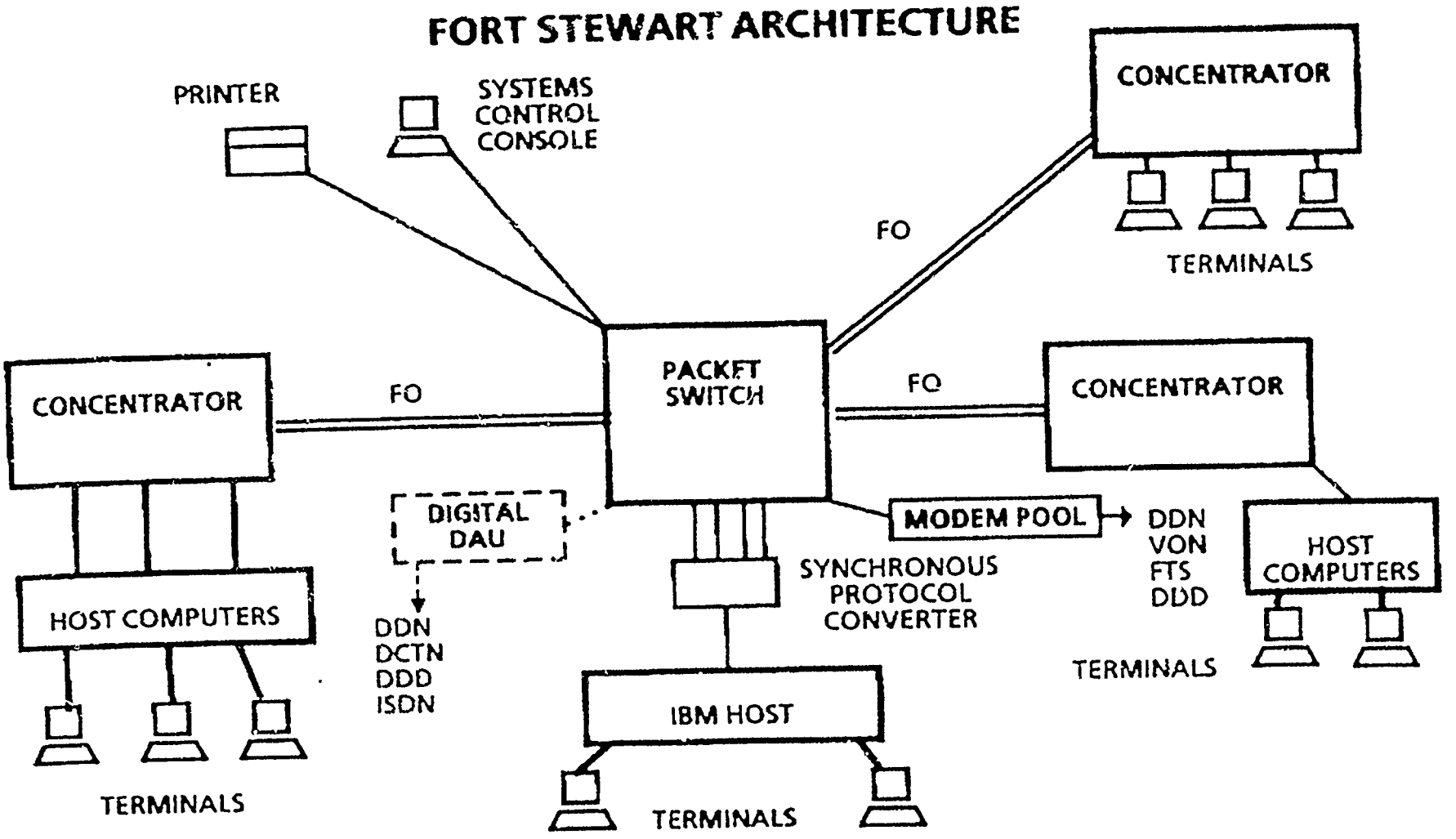
SYSTEMS AND INTEGRATION ENGINEERING - USAISEC, FT HUACHUCA, AZ

AREA ENGINEERING

CONTINENTAL UNITED STATES -	USAISEC-CONUS, FT RITCHIE, MD
EUROPE -	USAISEC-EUR, WORMS, GE
PACIFIC -	USAISEC, FT HUACHUCA, AZ

INITIAL IISIP SITE - FORT STEWART GA

- CONTRACT AWARD 30 SEP 87
- SYSTEM OPERATIONAL FEB 88


FORT STEWART ARCHITECTURE
PRINTER
SYSTEMS CONTROL CONSOLE
CONCENTRATOR
FO
TERMINALS
CONCENTRATOR
FO
PACKET SWITCH
FO
CONCENTRATOR
DIGITAL DAU
MODEM POOL
DDN
VON
FTS
DDD
HOST COMPUTERS
HOST COMPUTERS
SYNCHRONOUS PROTOCOL CONVERTER
DDN
DCTN
DDD
ISDN
TERMINALS
IBM HOST
TERMINALS
TERMINALS

ADOA EXPERIENCE

- Telephones/Computers Share Lines
- Place Digital Telephones in Executive Offices
- Place High-Speed Lines from Computer to Computer
- Introduce Packet Switching to ADOA
- Deploy Multi-Vendor Equipment

FUTURE IISIP SITES

HEIDELBERG,GE

FORT JACKSON, SC

FORT MONROE, VA

FORT HOOD, TX

FORT MCPHERSON,GA .

STUTTGART, GE

VAIHINGEN, GE

SCHOFIELD BKS, HI

DoD Planning for ISDN

Dr. Owen Halpeny, Defense Communications Agency

DoD PLANNING for ISDN

ISDN BRIEFING OUTLINE

- OVERVIEW
- DoD ISDN ACTIVITIES
- CONUS ISDN
- OCONUS ISDN
- BROADBAND ISDN
- SCHEDULE
- SUMMARY

OVERVIEW

- DoD ISDN EXECUTIVE GROUP LAUNCHED PLANNING PROCESS
- DoD ISDN WORKING GROUPS ARE UP AND RUNNING
- BASIC APPROACH DOCUMENTED IN DCA VISION 21 WHITE PAPER
- THE SECOND EDITION OF THE DoD ISDN NETWORK MIGRATION PLAN IS UNDER DEVELOPMENT
- DoD CONTRIBUTIONS ARE BEING MADE TO THE ISDN STANDARDS
- WHITE PAPER FORWARDED TO OJCS FOR VALIDATION

DoD ISDN ORGANIZATIONS

DoD ISDN EXECUTIVE STEERING COMMITTEE

DoD ISDN SYSTEMS WORKING GROUP*

DoD ISDN STANDARDS AND TECHNOLOGY WORKING GROUP

ACTIVE PARTICIPANTS

- US ARMY
- US AIR FORCE
- US NAVY
- DEFENSE COMMUNICATIONS AGENCY
- NATIONAL SECURITY AGENCY
- OFFICE OF THE SECRETARY OF DEFENSE (C^3I)
- JOINT TACTICAL C^3 AGENCY
- OFFICE OF THE JCS

* ASSOCIATE WITH INTEGRATED COMMUNICATIONS ARCHITECTURE WORKING GROUP

OBJECTIVES OF ISDN GROUPS

- DEVELOP THE DoD ISDN NETWORK MIGRATION PLAN WHICH ESTABLISHES GOAL FUNCTIONAL DESIGNS AND TRANSITION STEPS
- IMPACT CCITT/ANSI ISDN STANDARDS WITH DoD USER'S NEEDS
- INTERGATE ISDN INTO COMPOSITE DoD COMMUNICATIONS PLANNING
- EFFECT COORDINATED DEPT/AGENCY PLANNING
- SURFACE TECHNICAL ISSUES, PROPOSE METHODS OF SOLUTION, AND FOLLOW ON ACTIVITIES
- PRODUCE RECOMMENDATIONS FOR DoD

GROUP ACCOMPLISHMENTS/ WORK ITEMS

- SYSTEMS WORKING GROUP

  - SECOND EDITION OF DoD ISDN NETWORK MIGRATION PLAN NEARING COMPLETION AND BEING SCRUBBED

  - NEAR TERM LOCAL ISDN ISSUE FULLY ACCEPTED AS A HIGH INTEREST ITEM FOR THIS DoD GROUP (ALL WISH TO AVOID PREMATURE COMMITMENT TO ISDN)

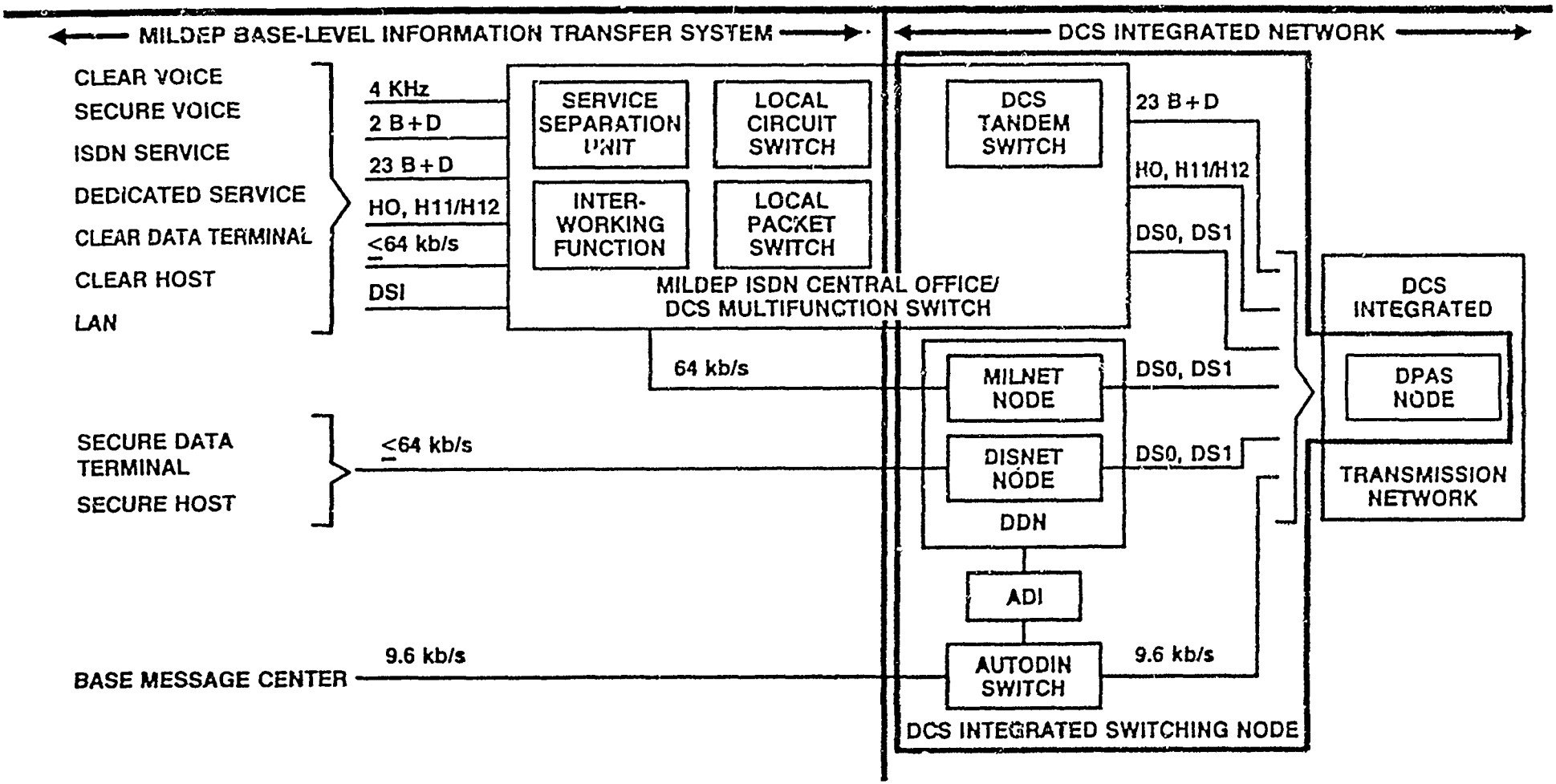
  - CURRENTLY ADDRESSING PERVASIVE ISSUES (E.G., TERMINALS, LOOPS, PBXs....)

- STANDARDS WORKING GROUP

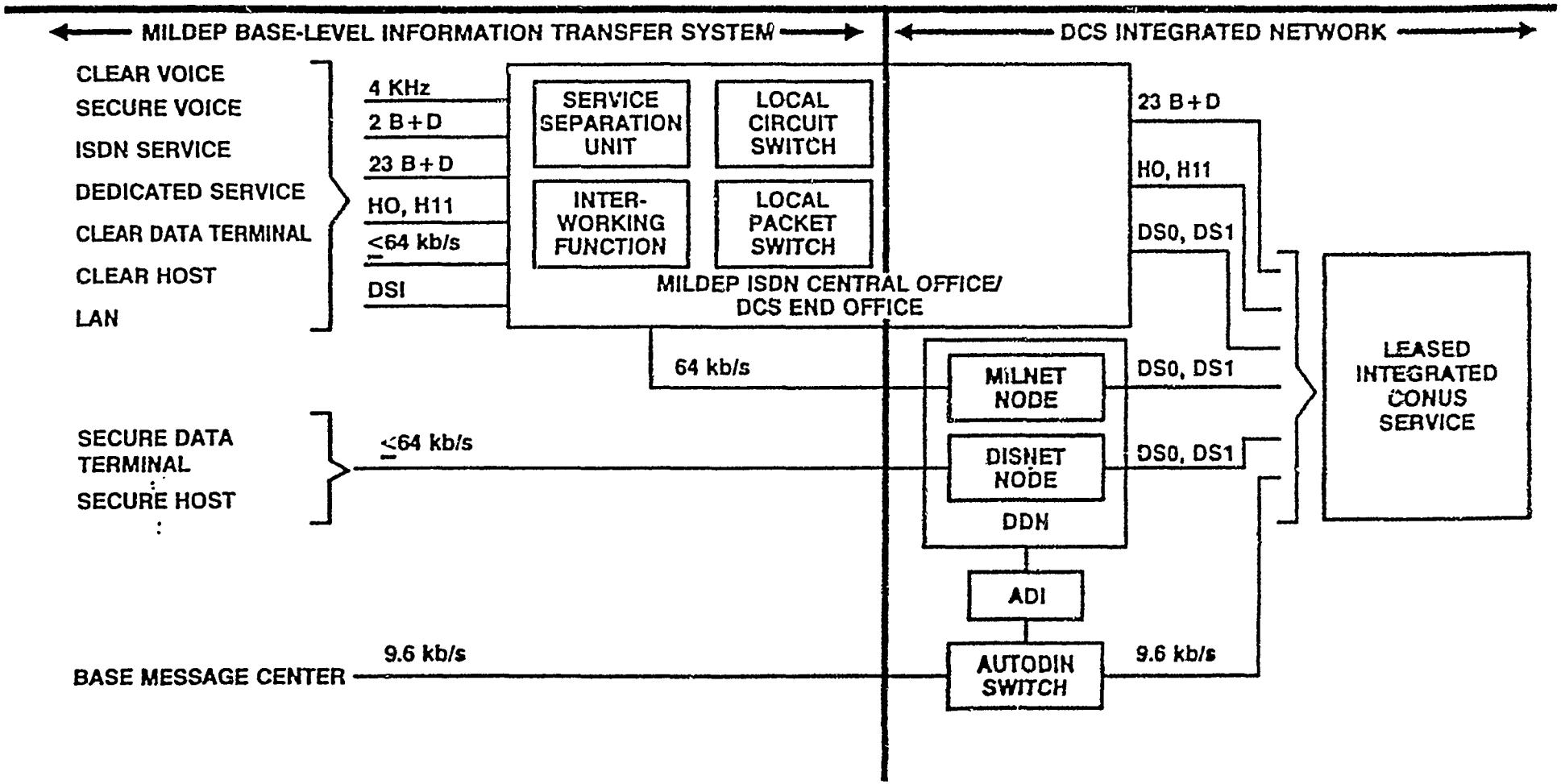
  - PRECEDENCE FIELD ACCEPTED BY U.S. EXCHANGE CARRIERS STANDARDS ASSOC. (INTERSWITCH SIGNALING)

  - CURRENTLY PURSUING: ACCEPTANCE OF PRECEDENCE FIELD FOR LOOPS, OFF-HOOK SERVICE, BROADCAST CONFERENCE, ETC.

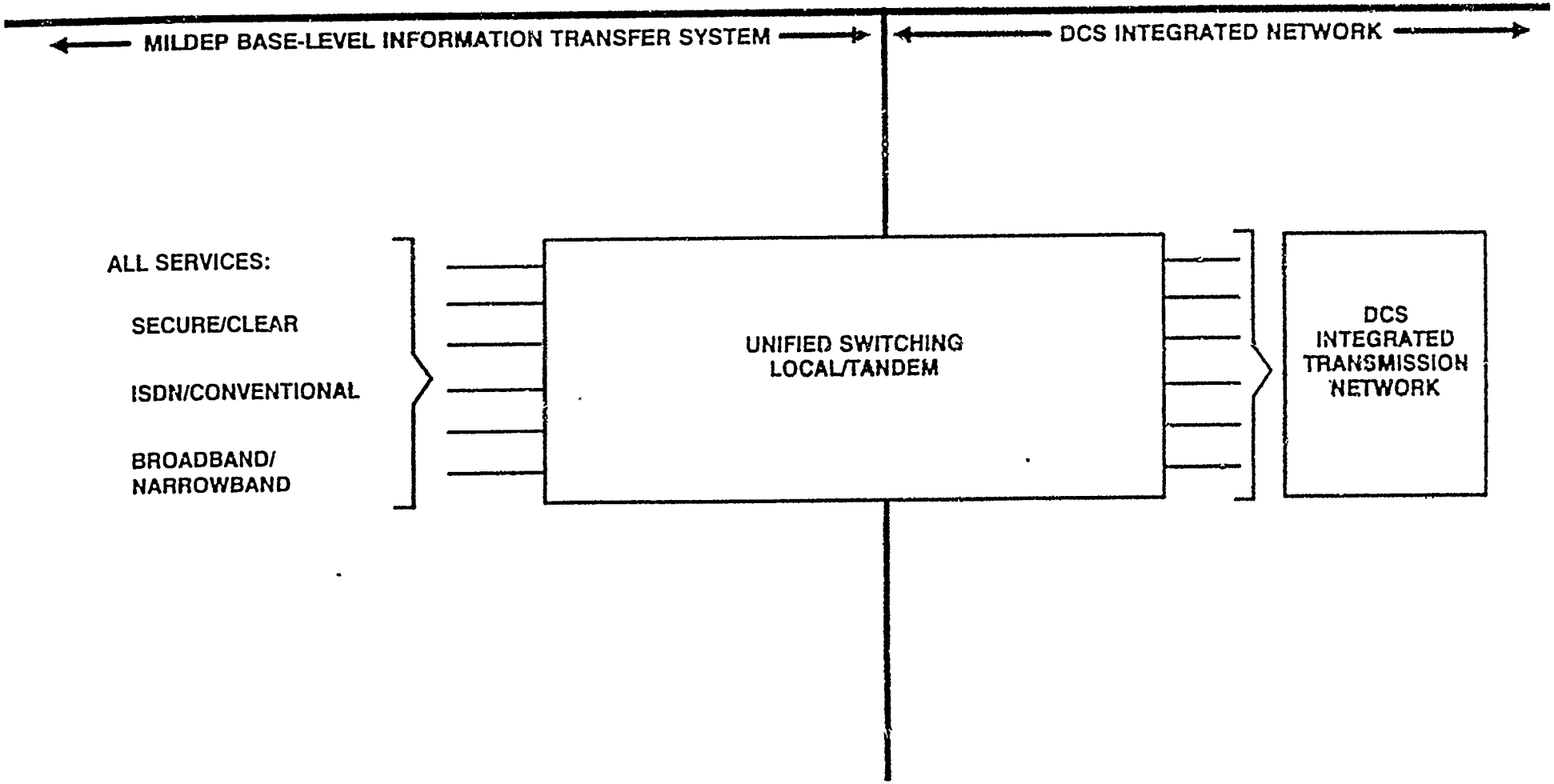
MID-TERM OVERSEAS ISDN INTEGRATED NETWORK



MID-TERM CONUS
ISDN INTEGRATED NETWORK



FAR-TERM
ISDN INTEGRATED NETWORK



OVERALL SCHEDULE
(DRAFT)

1985

PLANNING ACTIONS

- DoD ISDN NETWORK MIGRATION PLAN, 1ST ED.
- DoD ISND REQUIREMENTS, DEFINITION/VALIDATION;
- DoD ISDN NETWORK MIGRATION PLAN, 2ND ED.
- WORLDWIDE DIGITAL SYSTEMS ARCHITECTURE (WWDSA) UPDATE
- DoD POLICY STATEMENT; PROGRAM ACTIONS
- REVIEW 1988 "BLUE BOOK" AND COMMERCIAL ISDN SERVICE OFFERINGS
- COST EFFECTIVENESS QUANTIFICATION; SYSTEM DESIGN
- SYSTEM SPECIFICATIONS

1989

ACQUISITION ACTIONS

- FINAL INPUT TO DSN CONUS ACQUISITION PACKAGE
- UPGRADE CONUS ACCESS AREA PLANT, ACQUIRE TERMINALS, PBX MODS, ETC.
- UPGRADE OCONUS TRANSMISSION/SWITCHING/LOOP PLANT

1995

- IOC 1995

PRINCIPAL OPEN ISDN QUESTIONS

- REQUIREMENTS
- COMPLETE AND STABILIZED STANDARDS
- COST EFFECTIVENESS

SUMMARY

- WHITE PAPER, WITH ISDN APPROACH, TO OJCS APRIL 88
- ISDN MIGRATION PLAN REVISED AND COORDINATED BY NOV 88
- IMPLEMENTATION TARGET: 1995 IOC
- UNCERTAINTY REMAINS IN STANDARDS DEVELOPMENT

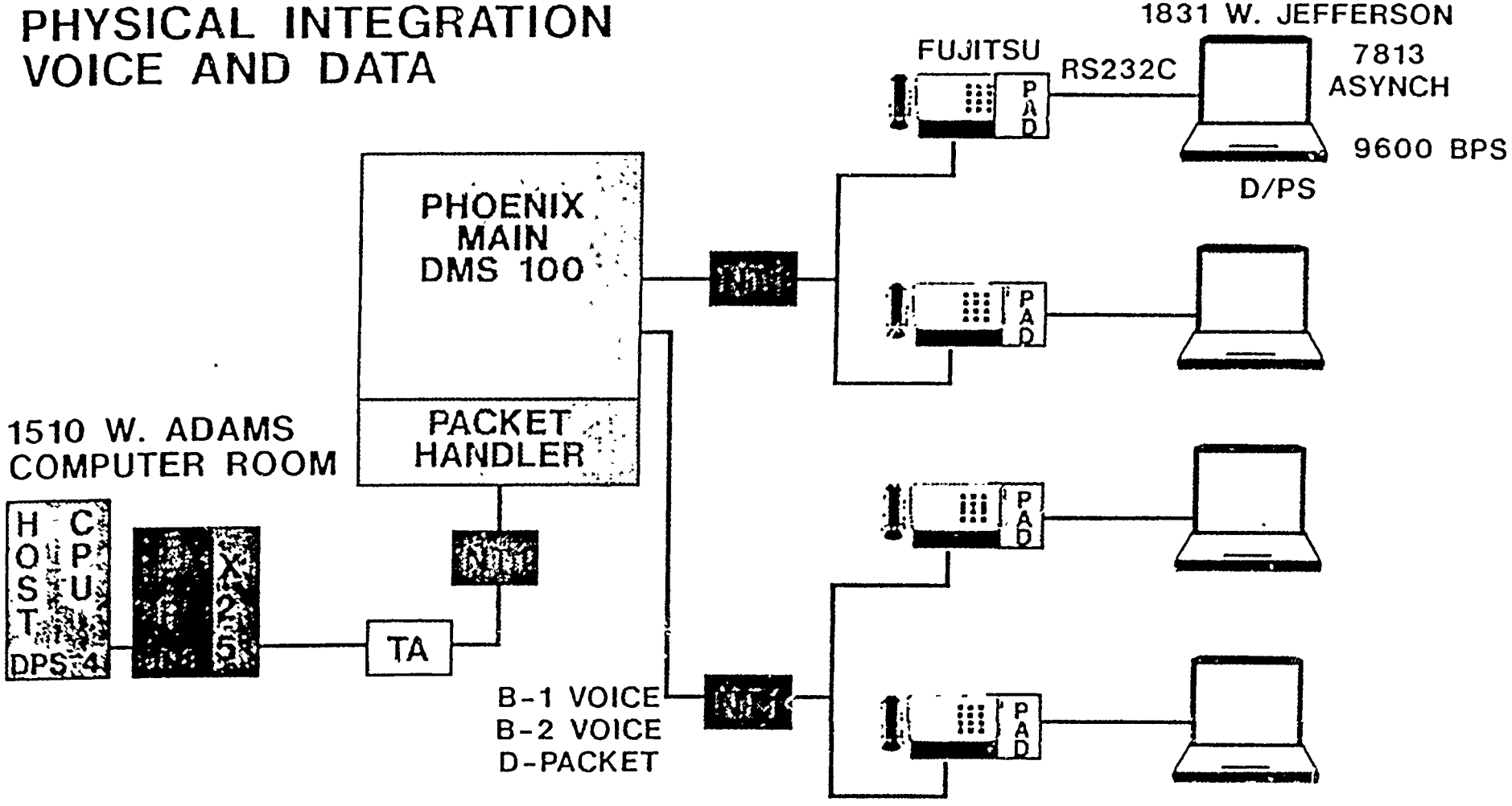
What We Learned

Mr. Matt Whittington, State of Arizona

1. Voice and Data/Computer Shops Must Plan Together
2. Technology of ISDN Network Is Functional
3. Standards Complement Procurement Process
4. ISDN May Be Cost-Effective

DEPT. OF ADMINISTRATION APPLICANT TRACKING

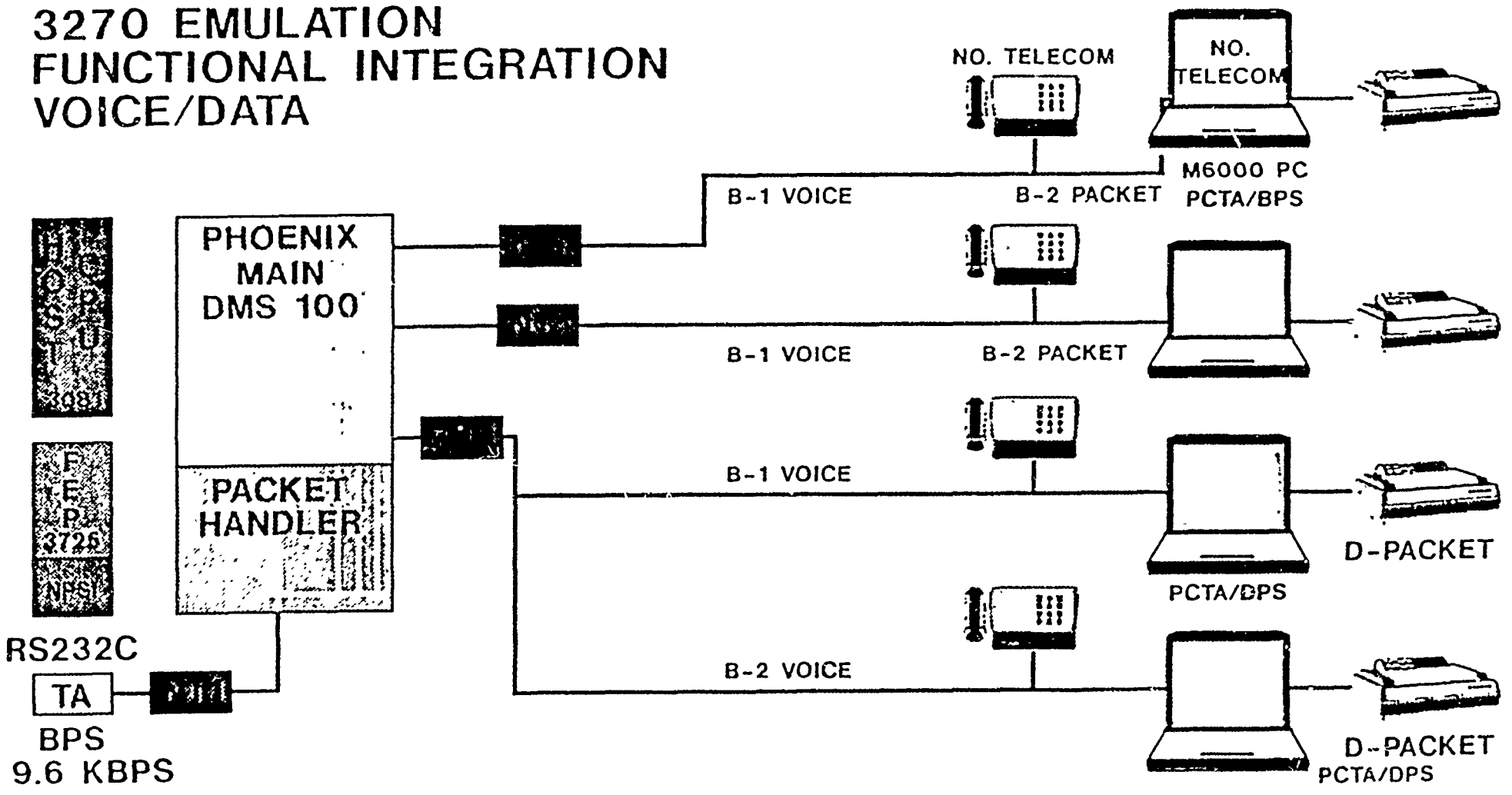
PHYSICAL INTEGRATION VOICE AND DATA



USWEST

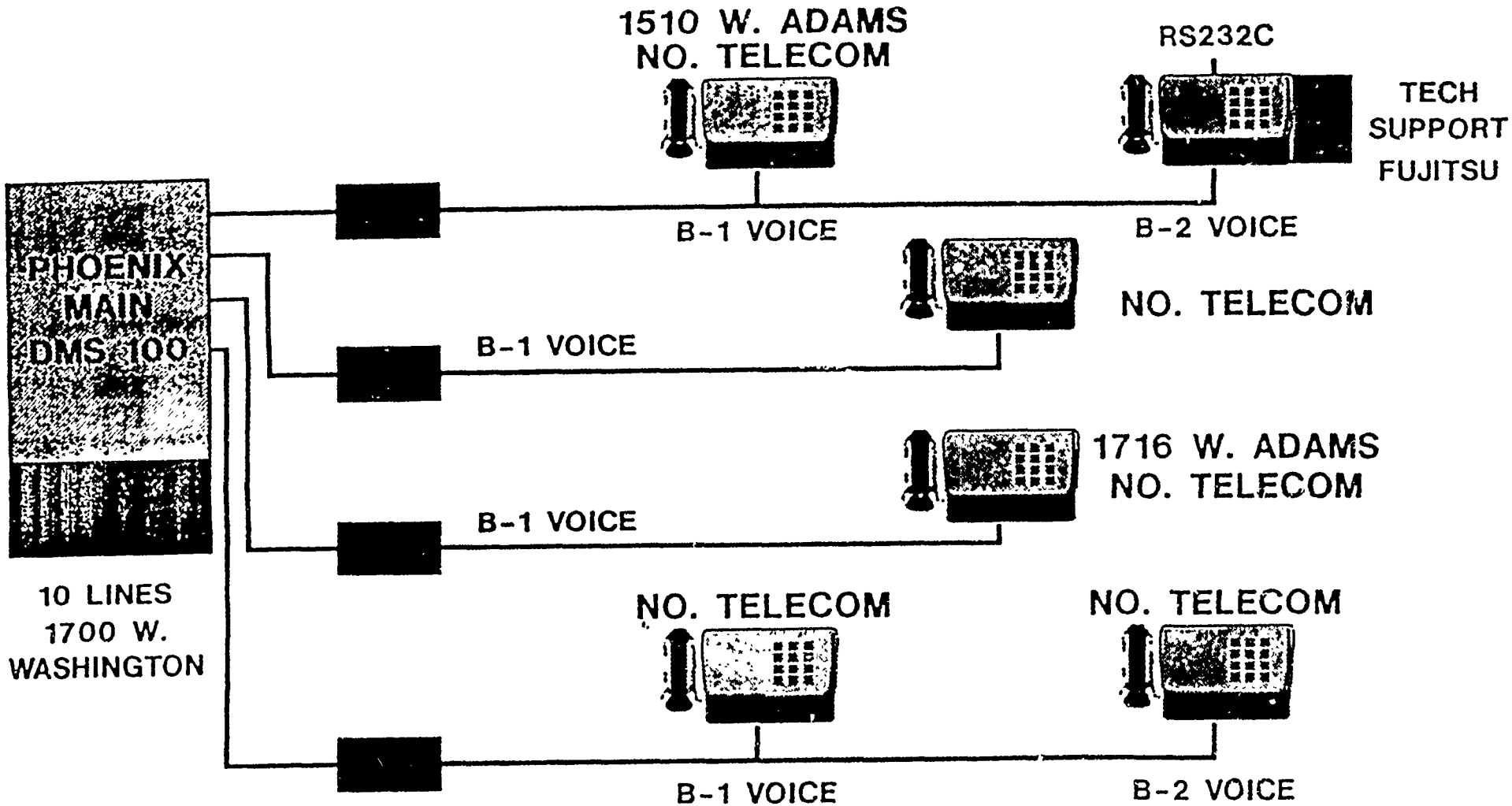
DEPT. OF ADMINISTRATION
PURCHASING OFFICE

3270 EMULATION
FUNCTIONAL INTEGRATION
VOICE/DATA



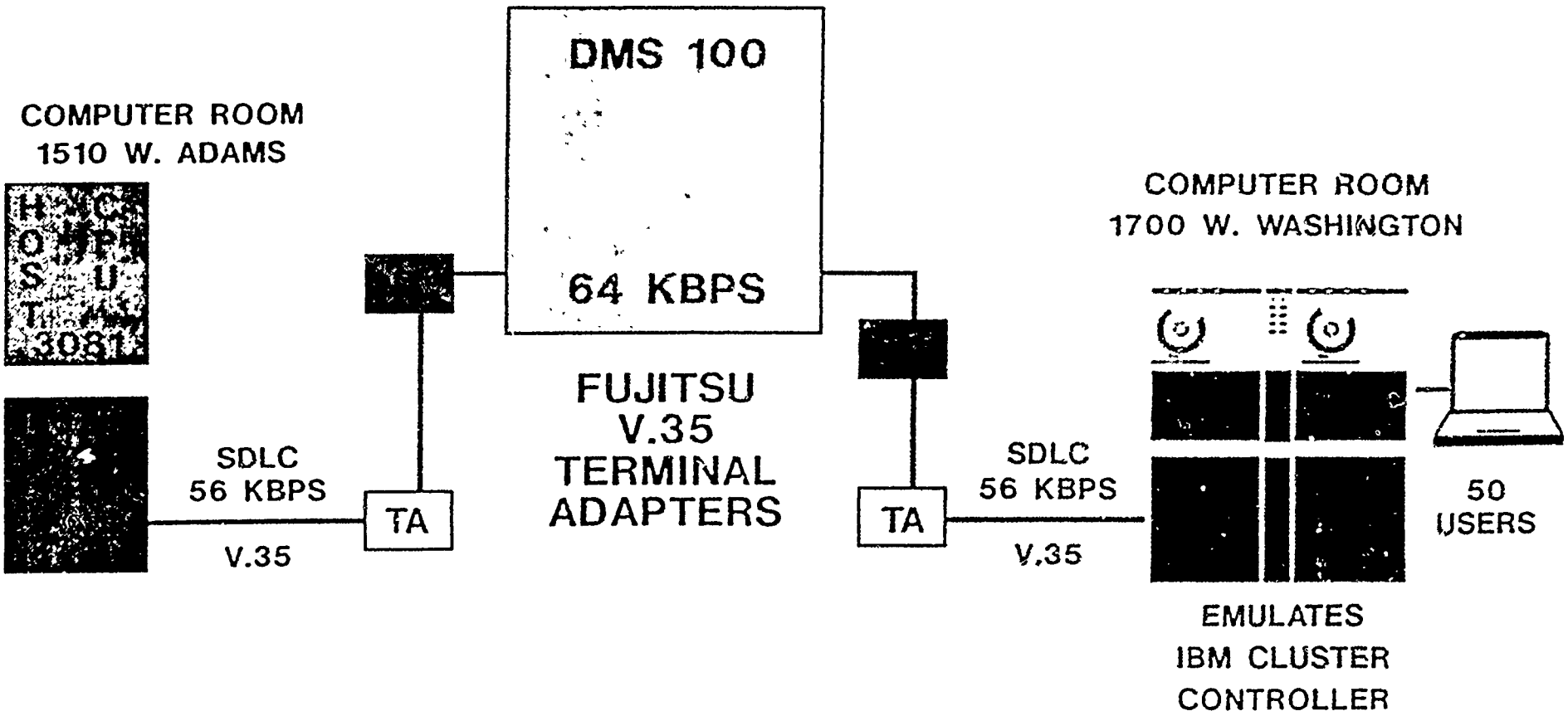
USWEST

DEPT. OF ADMINISTRATION



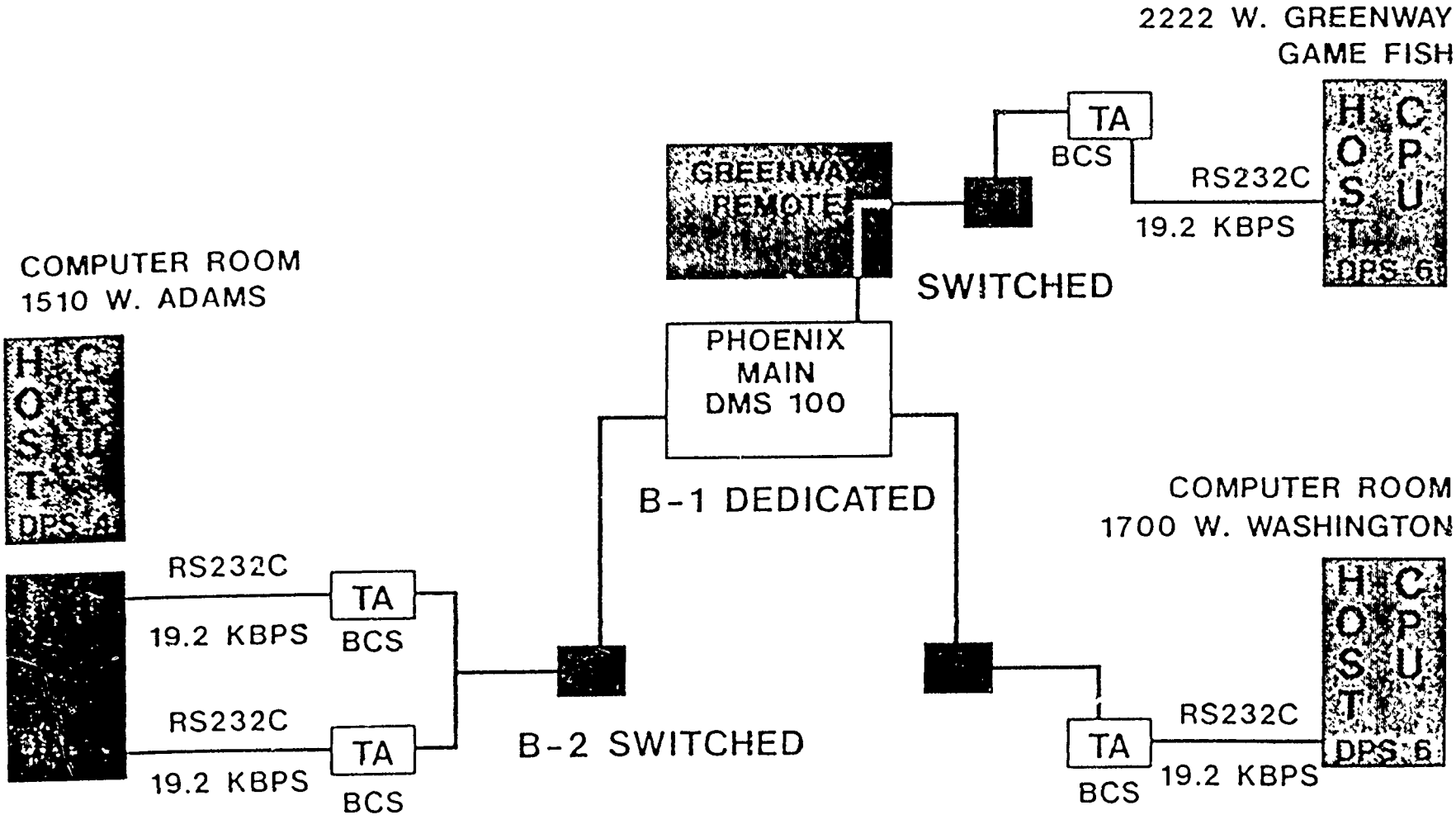
USWEST

DEPT. OF ADMINISTRATION
WIDEBAND V.35
PRIVATE LINE REPLACEMENT



USWEST

DEPT. OF ADMINISTRATION
PRIVATE LINE REPLACEMENT



USWEST

ISDN from U.S. West

Mr. Lee Bryant, Mountain Bell


ISDN
FROM US WEST

ISDN TRIAL OBJECTIVES

- Move technology from lab to customer
- Analyze various ISDN applications/technology
- Understand user benefits of applications
- Stimulate equipment development

THE FIRST

ISDN CALL

NOVEMBER 18, 1986

US WEST ISDN TRIALS

	DENVER	PHOENIX			PORTLAND	MINNEAPOLIS
CUSTOMERS	Mountain Bell 5 Downtown Denver Loc.	Honeywell Ariz. St. Gov. Mountain Bell	GTE Mountain Bell	[illegible]	US National Bank PNB	Control Data Minnesota Twins
SWITCH	NEC America NEAX 61E ISDN Adjunct	Northern TELECOM DMS 100	GTE GTD 5EAX	[illegible]	Northern DMS 100	NEC America NEAX 61E Adjuncts 2 Switches
CPE	NEC Provided Terminal Adpt. IVDT Digital SETS	Northern TEL Fujitsu DEC Infotron Harris	GTE Provided Terminal Adpts. PC	[illegible] Provided	Northern Hayes NEC	To Be Provided by NEC
SIZE	96 ISDN BASIC Access Lines	200 ISDN BASIC Access Lines	13 ISDN BASIC 2 PRIMARY	40 [illegible] BIC Access Lines	200 ISDN BASIC Access	200-300 ISDN BASIC ??? Access
START DATE	Dec. 1986	Nov. 1986	Dec. 1986	Feb. 1987	Mar. 1987	Sept. 1987
PHASE II PLANS	Add Primary Access and Remotes	Primary Access 800 Additional Lines SS7		Primary Access Additional Lines to Tech. Prefer Switch SS7	Additional Lines Additional CPE, IBM, WANG	Primary Access Additional Customers
CENTRAL OFFICES	Curtis Park	Phoenix Main North Northwest Greenway	Phoenix North Main	Chandler West	Capital	

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ISDN APPLICATIONS BEING ANALYZED IN US WEST ISDN TRIALS

- Video conferencing
- Asynchronous terminal networking
- Wide area networking
- LAN interconnection
- High speed facsimile
- Coax elimination
- SNA emulation
- Flexible database access
- Network integration
- Wiring simplification
- PC networking
- VAN/private network interconnection
- Enhanced call management
- Facsimile distribution
- High speed screen transfer
- Multiple terminal per access line
- Primary rate to PBX interface
- Work at home
- Security, systems monitoring
- Integrated voice, data, image
- Packet switching B/D channels
- Private line duplication
- D channel to B channel concentration
- Office automation with ISDN
- Enhanced ISDN terminals
- High speed circuit switch digital
- Network analysis
- Videotex
- PC to facsimile transfer

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TYPES OF TRANSMISSION

- B-Channels
  - Voice
  - Data
  - Circuit switched data
  - Facsimile
  - Packet switching
  - Video
  - Text
  - Graphics
  - Subrate

TYPES OF TRANSMISSION

- D-Channel
  - Call setup
  - Signaling
  - Information delivery
  - Telemetry
  - Security
  - Packet switching

CAPABILITIES ISDN PROVIDES THE NETWORK

- Uses Existing Wiring
- Digital Service
- Greater Transmission Speeds
- Access Line Integration
- Customer Control of the Network
- Industry Accepted Standard Interfaces
- A Separate Signaling Channel

ISDN ADDRESS SPECIFIC APPLICATION

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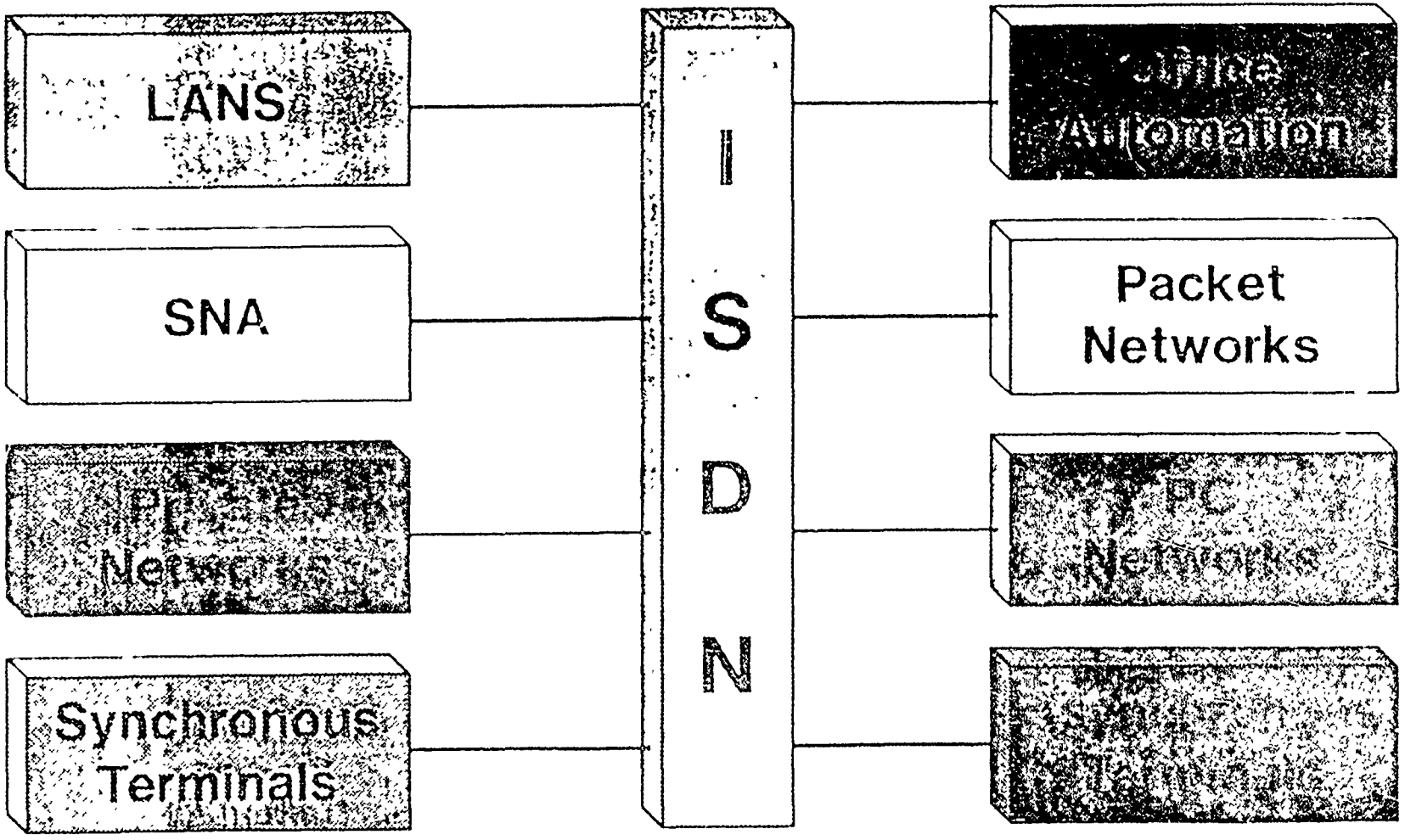
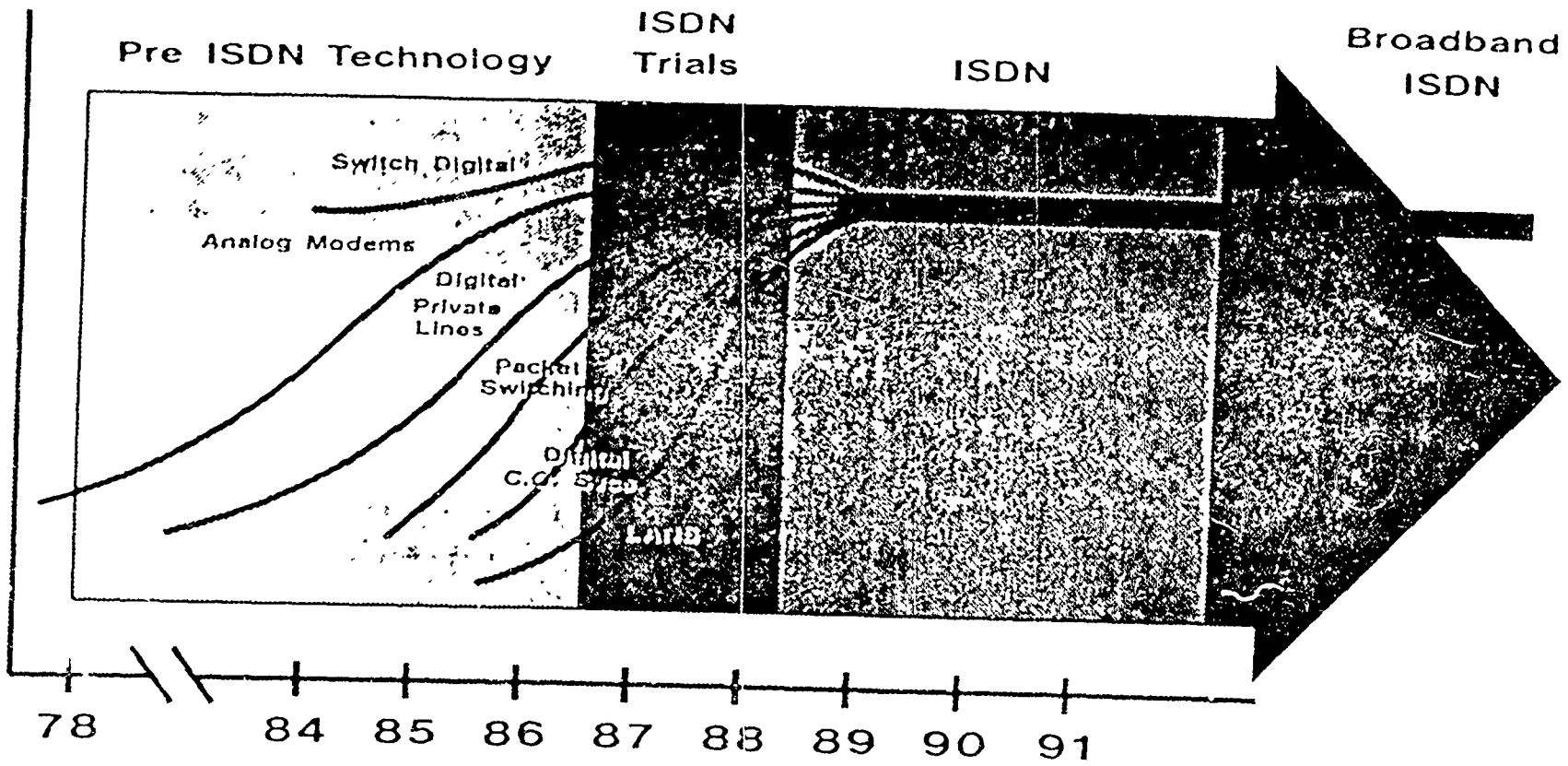
ISDN HAS ADAPTABILITY



USWEST

PREPARING FOR ISDN



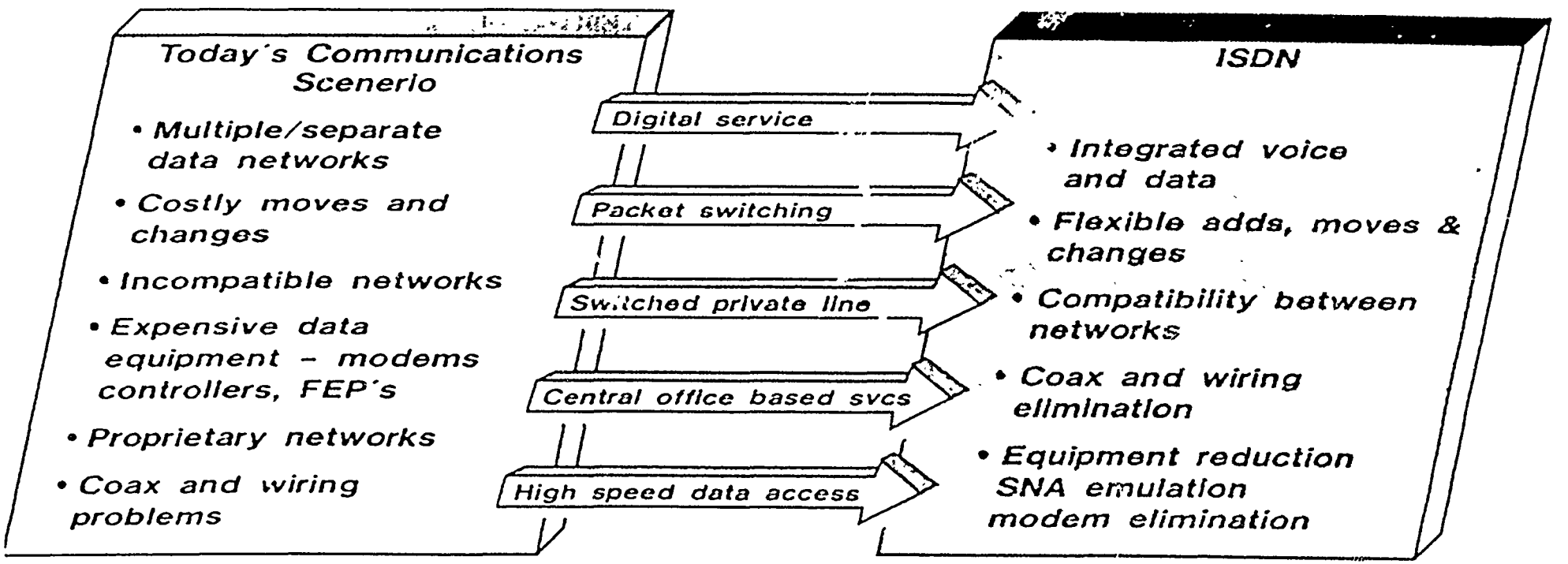
USWEST

POTENTIAL ISDN IMPACT

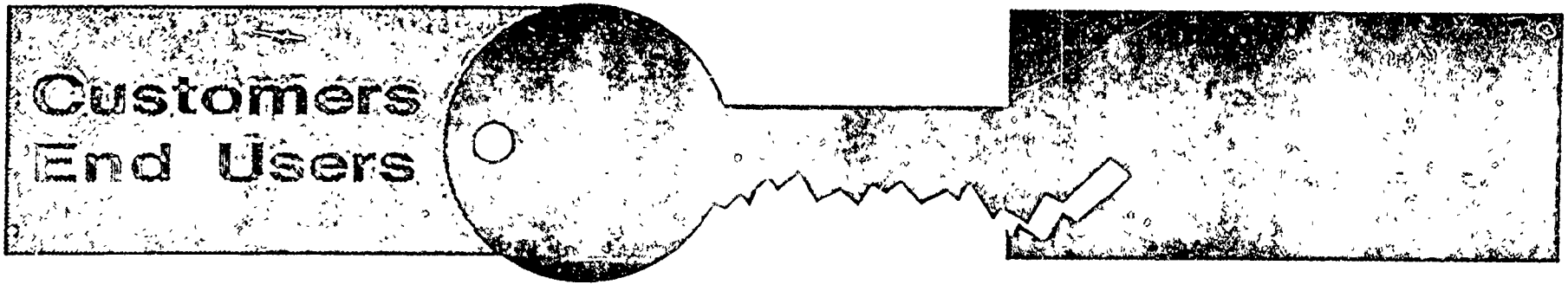
EQUIPMENT	NETWORK	OPERATION
Multiplexers	Wiring	
Modems	Coax	
Terminals	Private lines	
Controllers	LANs	
Front end processors	Separate networks	

USWEST

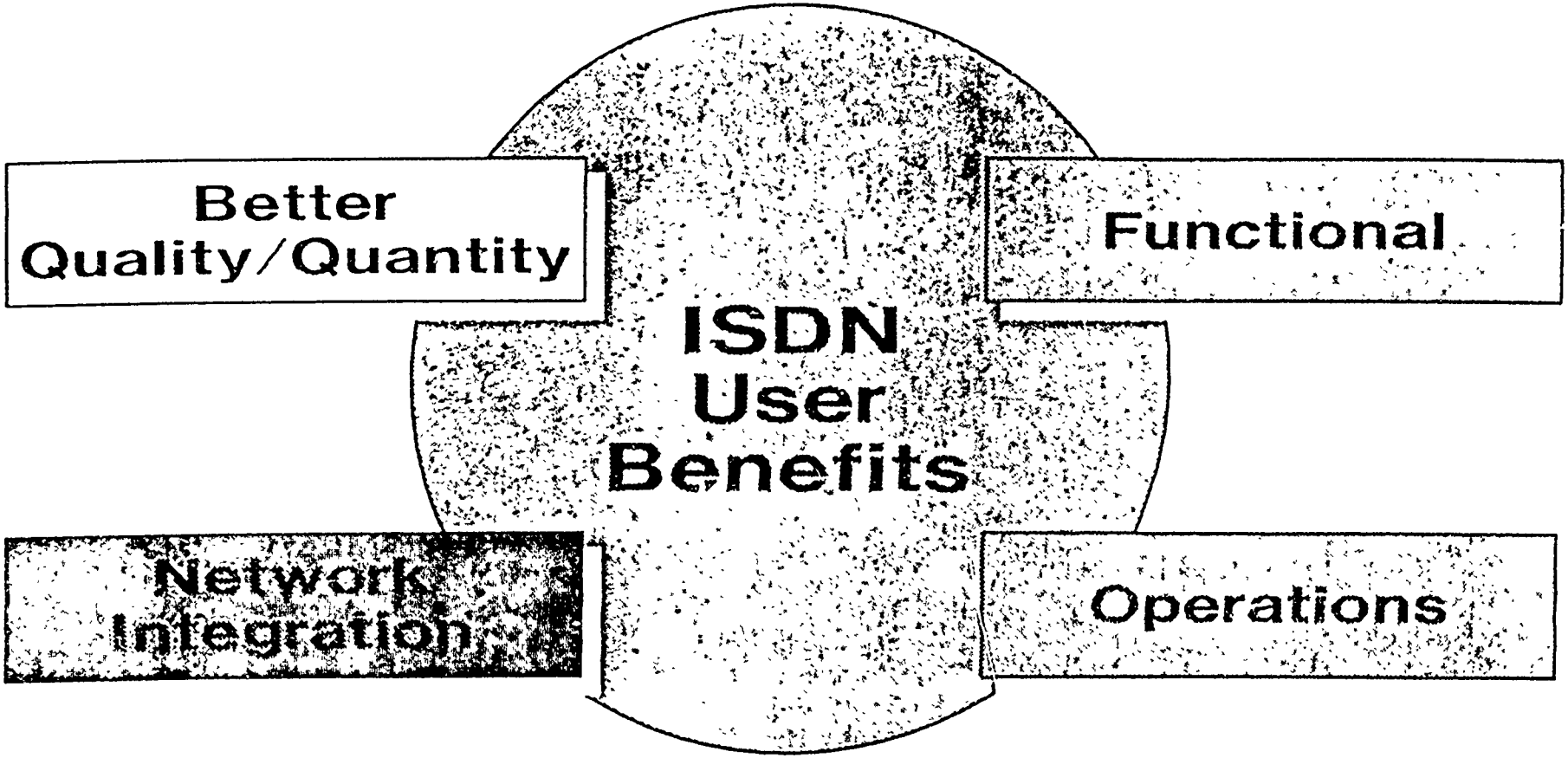
PREPARING FOR ISDN

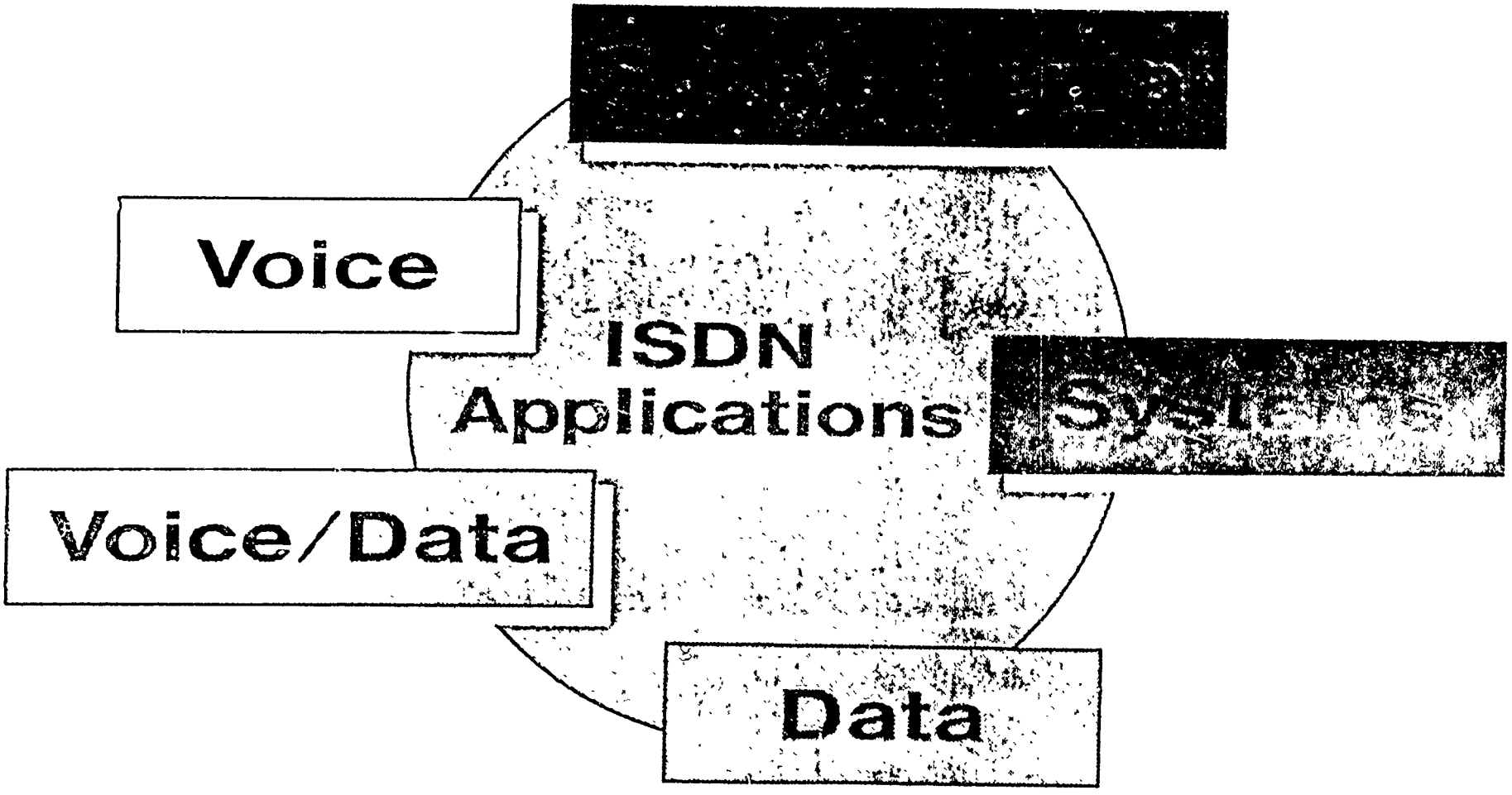


SUCCESSFUL ISDN



USWEST


Better
Quality/Quantity
Functional
ISDN
User
Benefits
Network
Integration
Operations


Voice
ISDN
Applications
Voice/Data
Data

ISDN HAS A HOME IN THE MARKETPLACE

USWEST

What's Key is a Win-Win Situation for US WEST

US WEST